Held inside Highly-functional Material Week

13th PLASTIC JAPAN

— High-performance Plastic Expo —

Shin-Etsu Silicone Products Guide

Silicones Making Resins

Highly Functional

Components of Resins and Coatings

Base Resins

Apply on the substrate as resin itself.

Improve other resins and impart them with the properties of silicones.

Additives

Modify the surface conditions of coatings.

Pigments & Fillers

Modify the surface of fillers to improve coating performance.

4 Usage

- Usage ① Silicone Based Resins
- Usage ② Resin Hybridization Agents
- Usage ③ Surface Modifiers for Coating
- Usage ④ Surface Modifiers for Pigments & Fillers

Highly Functional Silicone Rubbers

- Silicone Rubbers for Molding
- Heat-Shrinkable Rubber Tubing
- Liquid Silicone Rubbers
- Thermal Interface Materials
- Silicone Adhesive Sheet for Civil Engineering and Construction

Shin-Etsu Silicone

Silicones Making Resins Highly Functional

Resin compositions are mainly composed of "Base Resins," "Additives," and "Pigments & Fillers." Shin-Etsu Silicone has the following four uses and products for these three components to enhance the functionality of various resins.

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Components of Resins and Coatings

Base Resins
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Improve other resins and impart them with the properties of silicones.

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Highly Functional Silicone Rubbers

Taking advantage of the excellent properties of silicone,
you can achieve high quality and functionality in your products.

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Release Property

Solventless Low Viscosity Silicone Release Coatings for Plastic Films

Product Usage

Silicone Based Resins

X-62-1929 / X-62-1931-1

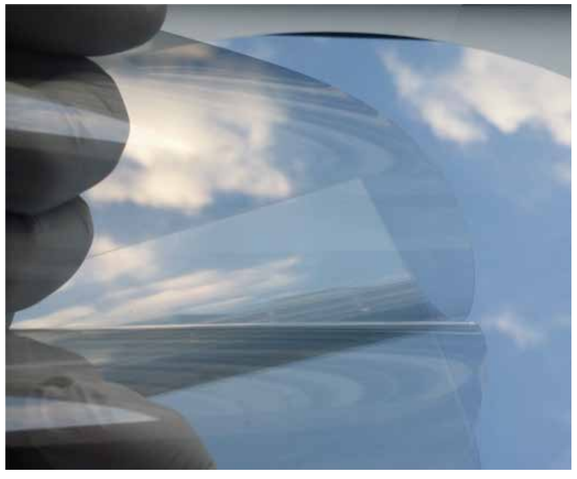
Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

Features and Benefits

- It is solventless and has extremely low viscosity.
- Thin coating with a coating weight of up to 0.1g/m^2 is possible.
- It can be applied more smoothly than conventional products.
- No blocking occurs.
- It is possible to reduce platinum content.
- It adheres to the film.

Applications

- Release agents for films



Release-coated film

Release Properties

Formulation		Formulation 1	Formulation 2	Formulation 3
Conventional product	Viscosity 390 mm^2/s	100	-	-
X-62-1929	Viscosity 50 mm^2/s	-	100	-
X-62-1931-1	Viscosity 20 mm^2/s	-	-	100
X-92-263 (Adhesion improver)		10	10	-
CAT-PL-56 (Catalyst)		2.0	2.0	0.7
Release properties				
Coating amount g/mm^2	X-ray fluorescence analysis	0.30	0.38	0.35
Initial cure	Presence of finger marks	+(None)	+(None)	+(None)
Release force N/25mm	25℃_70g/cm^2_20h	0.19	0.11	0.12
	70℃_20g/cm^2_20h	0.28	0.11	0.18
Subsequent adhesion %	25℃_70g/cm^2_20h	95	102	85
	70℃_20g/cm^2_20h	105	105	90
Amount of migration kcps	X-ray fluorescence analysis	0.60	0.51	0.68
Adhesion Initial	Finger rub 10 times	+	+	+
Adhesion after 3 weeks	Finger rub 10 times	-	-	+ to ±

Substrate：38μm PET film　Curing conditions：120℃×3.6sec　Application method：5 rolls　Tape：TESA-7475　(Not specified values)
Liner aging：3 weeks　Label aging_20h：25℃_70g/cm^2, 70℃_70g/cm^2

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Release Property

Ultra-Easy Release Silicone Release Coatings for Plastic Films (Solvent Type)

Product Usage

Silicone Based Resins

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- Ultra-easy release is possible while maintaining a high subsequent adhesion.
- High anchorage to film substrates

■ Applications

- Release agents for films

■ General Properties

Item / Product name	Appearance	Non-volatile content %	Viscosity mPa・s	Solvent
X-62-2888	Colorless transparent to paleyellow translucent	30	10,000	Toluene
X-62-2892	Colorless transparent to paleyellow translucent	30	7,000	Toluene

(Not specified values)

Item / Product name	Label aging 25°C, 70g/cm² ,1 day		Label aging 70°C, 20g/cm² ,1 day		Anchorage
	Release force N/25mm	Subsequent adhesion %	Release force N/25mm	Subsequent adhesion %	
KS-847T	0.15	100	0.24	99	+
X-62-2888	0.09	94	0.15	95	+
X-62-2892	0.08	94	0.09	93	+

Substrate: 38 μm PET film　Curing conditions: 120° C x 30 s　Coating weight: 0.2 g/m²　Liner aging: 25° C x 1 day　Tape: TESA-7475

(Not specified values)

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Water Repellency

Solvent-based Water Repellent for Textiles

Product Usage

Silicone Based Resins

POLONCOAT-I

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- The fabric becomes water-repellent by soaking it in the product and then drying it.
- It can be used on a variety of materials including cotton and polyester.

■ Applications

- Water-repellent treatment of fabric

■ How to use

1 . Use IPA or a hydrocarbon solvent to dilute the active ingredient to about 0.5-5%.

2 . Immerse the fabric in the adjusted solution and dry it at room temperature to 150℃ for a few minutes to several tens of minutes.

■ General Properties

Parameter \ Product Name	POLONCOAT-I
Active ingredient wt%	50
Solvent	IPA
Appearance	Yellow Liquid
Viscosity at 25℃ mPa・s	20

(Not specified values)

■ Water Repellency Evaluation

JIS L 1092 (Spray Test)

It exhibits water repellency of Grade 4 or higher.

Test conditions :

1. Polyester fabric is immersed in a treatment bath containing 1% diluted active ingredient and then squeezed out.
2. Leave for 30 minutes, then heat treatment at 105℃ for 2 minutes.
3. Water repellency evaluation: JIS L 1092 (spray test) was conducted.

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Anti-fogging Slip

Water-absorptive Anti-fog Coating Agent

Product Usage

Silicone Based Resins

X-12-1402A

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

Features and Benefits

- Excellent water resistance and anti-fog durability.
- Forms a coating film with slipperiness, high hardness and excellent scratch resistance.
- Since there is no water film, visibility is kept good. Also, it does not freeze.

Applications

- Anti-fog treatment for glass and transparent resin (polycarbonate, etc.)

Anti-fog Mechanism

Water-absorptive Type	Untreated	Caution
		
Coating absorbs water vapor to maintain transparency.	Water vapor becomes water droplets and gets fogging.	Water droplets are generated when the moisture absorption limit is exceeded.

General Properties

Parameter \ Product name		X-12-1402A
Active ingredient	wt%	35
Solvent		PGME
Appearance at 25°C		Pale yellow liquid
Viscosity at 25°C	mm^2/s	70
Standard curing conditios		120℃×30 min recommended film thickness 10-20 μm

(Not speficied values)

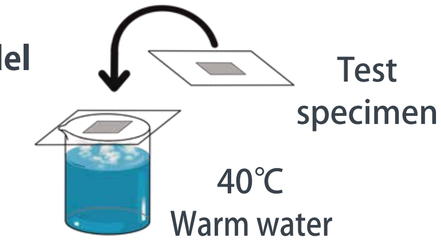
Anti-fog Coating Agent Test Result

Base material: Polycarbonate, Film thickness: 13 μm
Scratch resistance: Paper wiper/1 kg/1,000 times

Anti-fog coating agents	X-12-1402A	X-12-1372A (Shin-Etsu conventional product) (Water-absorptive)	No-coating
Initial Anti-fog Performance	Good 	Good 	Bad 
Time until cloudy after exposure to steam at 40°C	50 sec	60 sec	0 sec
Surface Pencil Hardness	H	HB	HB
Scratch Resistance	No damage	Peel off	Damage

(Not specified values)

Anti-fog test evaluation model



We are also developing a super-hydrophilic anti-fog coating material.

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Anti-rust

Anti-rust Coating Agents

Product Usage

Silicone Based Resins

X-12-1442B

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- This is a **moisture-curing** coating agent that contains a special structure.
- It is a **solvent-free**, low viscosity coating agent.
- It has excellent adhesion to metal and **durable anti-rust properties**.

■ Applications

Anti-rust treatment for aluminum and galvanized steel sheets

■ General Properties

Item \ Product name	X-12-1442B
Active ingredient wt%	100
Appearance at 25℃	Yellow liquid
Viscosity at 25℃ mm^2/s	30 to 50
Standard curing conditions	Room temperature × 1 day Target film thickness 20μm

(Not specified values)

■ Salt Spray Test Results

Substrate pretreatment: Wipe the aluminum plate with toluene
Top coating: After adding a curing catalyst, apply with a bar coater → Dry at room temperature for 1 day
Salt spray tester was used (Suga Test Instruments Co., Ltd.)

＊We are also developing anti-rust coating agents for iron and copper.
If you are interested, please contact sales representative.

Anti-rust Agent X-12-1442B	Substrate : Aluminum Salt spray : 72h
	

Anti-rust Agent Development Product for Iron	Substrate : Iron Salt Spray : 24h
	

Anti-rust Agent Development Product for Copper	Substrate : Copper Salt Spray : 168h
	

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Water Based　Water Repellency

Water-based Water-repellent Coating Agent (Fluorine-free)

Product Usage

Silicone Based Resins

KR-4000GE

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- It is an emulsion type of silicone resin (KR-4000G).
- Curing proceeds at room temperature without the need for a catalyst.
- Compared to conventional silicone RESIN emulsions, it has high water repellency.
- Compared to conventional silicone OIL emulsions, it has high durability.

■ Application Examples

- Antifouling coating agent

■ General Properties

Product name	KR-4000GE
Type	Methyl type resin emulsion
Viscosity at 25℃ mPa・s	300 - 2,000
pH	6 - 8
Active ingredient %	55 (Water solution)
Recommended usage	Wipe application (thin film application)

(Not specified values)

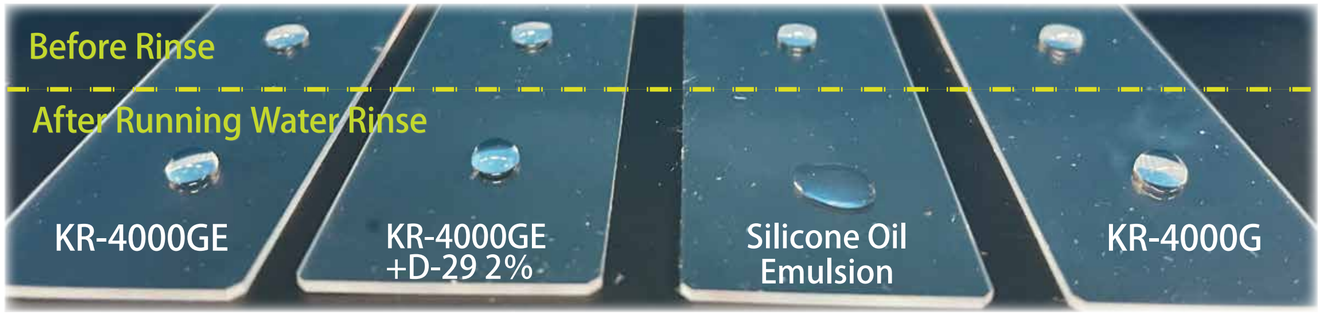
■ Coating Properties

Product name		KR-4000GE	KR-4000GE +D-29 2%※1	Silicone Oil Emulsion※2	KR-4000G※3
1day after application	Water contact angle(2μL)	95	97	101	101
	Water fall angle(20μL)	44	44	39	37
	Magic marker cissing	+	+	-	+
Rinse under running water *4	Water contact angle(2μL)	100	101	63	100
	Water fall angle(20μL)	45	40	54	39
	Magic marker cissing	+	+	-	+

(Not specified values)

*1 Ti catalyst made by Shin-Etsu Chemical Co., Ltd.
Water repellency is observed even in aqueous solution after 3 months of mixing
*2 Water-based water-repellent coating made by Shin-Etsu Chemical Co., Ltd.
*3 Solvent-based water-repellent coating made by Shin-Etsu Chemical Co., Ltd.
*4 Rinse under running water for 10 minutes, then wipe off with tissue.

■ Water Repellency after Running Water Rinse



* The upper side is unwashed, and the bottom side is after 10 minutes of running water rinse, wiping with tissue, and then dripping 0.02 mL of water onto it.

PR POINT

Although it is water-based, it has high water-repellent durability.

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Emulsifier-free | Water Based | Weather Resistance | Rapid Cure | Heat Resistance | Stain Resistance

Emulsifier-free Water-based Rapid Curing Silicone Resin (Phenyl Type)

Product Usage

Silicone Based Resins

KRW-6002

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- It is a water-dispersed type of silicone resin.
- It has excellent resin compatibility and can be used in combination with organic resins.
- It has excellent heat resistance and can be used at high temperatures of around 250℃.
- A film is formed as the water evaporates at room temperature.
- It does not contain organic solvents, and the only component generated during the curing reaction is WATER.
- No emulsifiers are used, and a 100% silicone film can be formed.
- It cures at room temperature, but the curing time can be shortened by heating.

■ Applications

- Resin binder
- Resin modifier
- Heat resistant paint

■ General Properties

Item \ Product name	KRW-6002	KRW-6001	KRW-6000
Type	Methyl/Phenyl Type	Methyl Type	Methyl Type
Film hardness	Soft	Soft	Hard
Viscosity at 25℃ mm^2/s	2 - 2,000		
pH	7 - 9		
Active ingredient %	30 (Water solu-		
Recommended film thickness μm	<100	<50	<10

(Not specified values)

■ Curability of the Product Alone

Conditions & Item \ Product		KRW-6002	KRW-6000	KR-242A※1
Room temperatue	Tack-free	< 5 min	< 5 min	< 5 min
	Pot life	> 3 months	> 3 months	> 3 months
Room temperature ×1 week	Solvent resistance	±	±	-
	Pencil hardness	6B	3B	6B
80℃×10 min	Solvent resistance	±	+	-
	Pencil hardness	3B	F	4B
120℃×3 min	Solvent resistance	+	+	-
	Pencil hardness	4B	F	4B
150℃×1 min	Solvent resistance	+	+	-
	Pencil hardness	2B	F	2B
100℃×10 min → Room temperature × 1 week	Solvent resistance	+	+	-
	Pencil hardness	2B	2H	B

Substrate：Polished steel sheet , Bar coater #14, (Not specified values)
Solvent resistance evaluation criteria：Acetone & toluene rubbing 50 times : Pass = + ,
Only toluene pass = ±, Acetone & toluene both failed = -
* 1 Shin-Etsu product solvent based resin

■ Advantages Over Other Resins

Item \ Product name	KRW-6002				KRW-6000	
Organic resins	Acrylic※1		Acrylic urethane※2		Acrylic※1	
Resin blend ratio Solid content (Organic resins / Si)	80 / 20	20 / 80	80 / 20	20 / 80	80 / 20	20 / 80
HAZE of film	<1	<1	<1	<1	1.5	2.5

Substrate: Glass plate, bar coater #14 Coating haze: Coating after 1 week at room temperature measured with a haze meter (Not specified values)
*1 Water based acrylic emulsion made by SAIDEN CHEMICAL INDUSTRY CO.,LTD.
*2 Water-based acrylic polyol Em + water-based isocyanate curing agent made by DIC corporation

PR POINT KRW-6002 has excellent compatibility with organic resins, so it can be used in combination with organic resins.

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Emulsifier-free | Water Based | Weather Resistance | Rapid Cure | Heat Resistance | Stain Resistance

Emulsifier-free Water-based Rapid Curing Silicone Resin

Product Usage

Silicone Based Resins

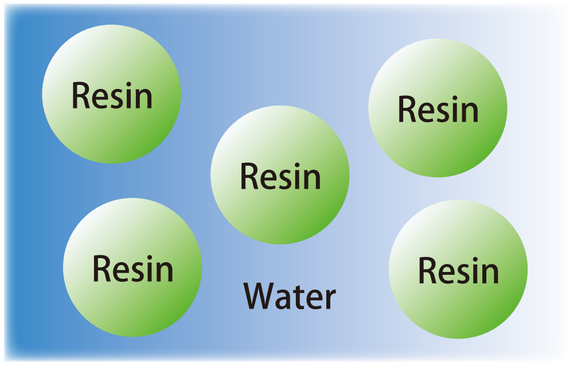
KRW-6000 Series

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Structure Model

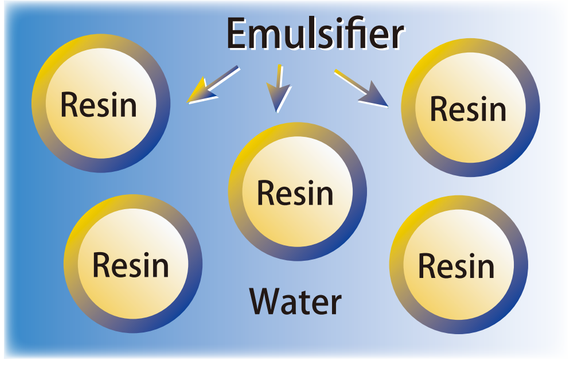
By introducing a special structure,
Emulsifier-free has been achieved.

Expected properties = Improved weather resistance, heat resistance, water resistance, and moisture resistance



KRW-6000 Series

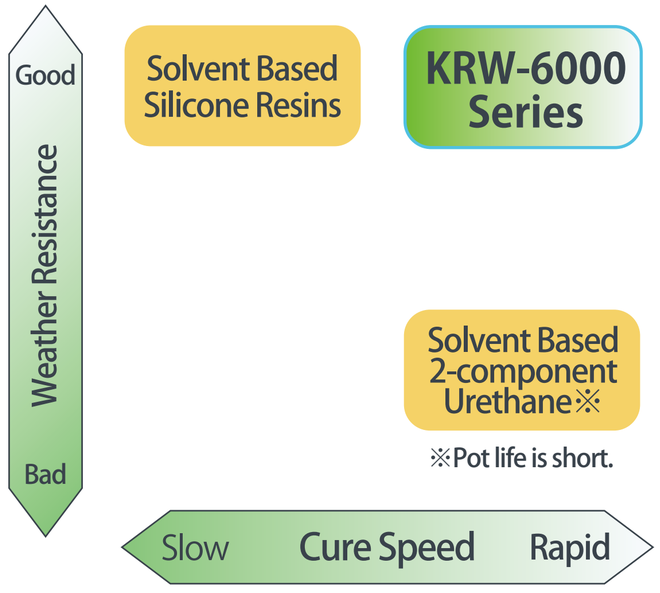
VS

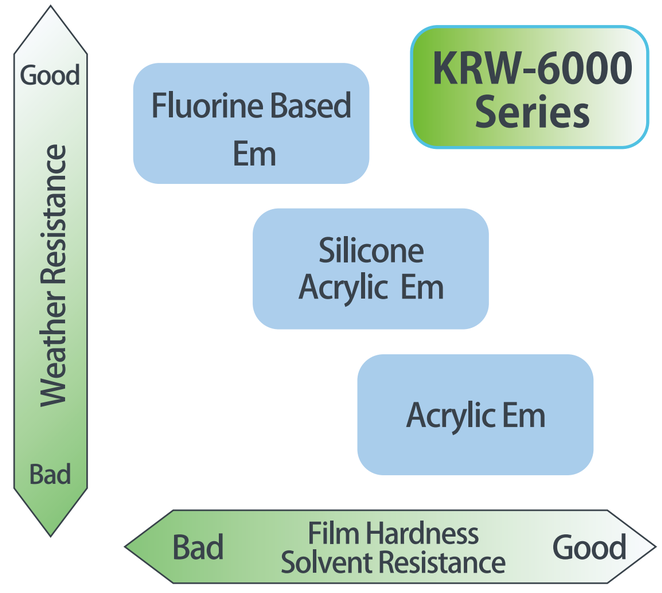


Conventional Silicone Resin Emulsion
Strongly hydrophobic, emulsifier is essential.

■ Advantages Over Other Resins

The KRW-6000 series forms a coating that cures quickly and has excellent weather resistance.
It is a water-based, one-component type, so it has a long pot life.





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High Hardness Scratch Resistance　Weather Resitance

Silicone Coating Material for Plastic Substrates

Product Usage

Silicone Based Resins

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- Adheres to plastic substrates.
- Available in room temperature, heat and UV curing types.
- It forms a coating that has excellent hardness, scratch resistance, and weather resistance.

■ Coating Layer Model

Coating with Excellent Hardness, Scratch Resistance, Weather Resistance, etc.

Silicone Coating Layer

Substrate = PC, Epoxy, PVC, ABS, Acrylic, Urethane

■ Product Lineup

Product name	Applicable resin substrate	Cure Type	Active ingredient %	Solvent	Viscosity mm^2/s	Recommended curing conditions	Features	Curing catalyst blend
PC-17 / X-12-2244	PC	Heating	20 / 25	PGM/IPA ※2	45 / 6	120℃×1h	Scratch resistance, weather resistance, UV shielding properties	Unnecessary
X-88-1004	Acrylic	Room temperature	100	-	3.5	25℃/50%RH ×1day (Tack-free 60 min)	High hardness	Necessary※3
X-88-1007	Acrylic, PVC	Room temperature	100	-	19	25℃/50%RH ×1day (Tack-free 90 min)	Water repellency	Necessary※3
X-88-2019A	Urethane	Room temperature	100	-	8	25℃/50%RH ×1day (Tack-free 30 min)	Water repellency	Unnecessary
X-48-1407	PC, Epoxy, PVC, ABS	Room temperature	100	-	1.3	25℃/75%RH ×1day (Tack-free 30 min)	High hardness	Unnecessary
X-48-5030※1	PC, Acrylic	UV	100	-	35	**In air**, high pressure mercury lamp 1,800mJ/m^2	High hardness	Unnecessary
X-48-5031※1	PC, Acrylic	UV	100	-	50	**In air**, high pressure mercury lamp 1,800mJ/m^2	High hardness, weather resistance	Unnecessary

(Not specified values)

※1 The main component is acrylic resin.
※2 PGM：Propylene glycol monomethyl ether acetate,　IPA：Isopropyl alcohol
※3 When creating thick films, it is necessary to use silicone solvent in combination.

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Surface slipperiness Lubricity

Stain resistance

Mold releasability

Silicone Master Pellets for Resin Modification

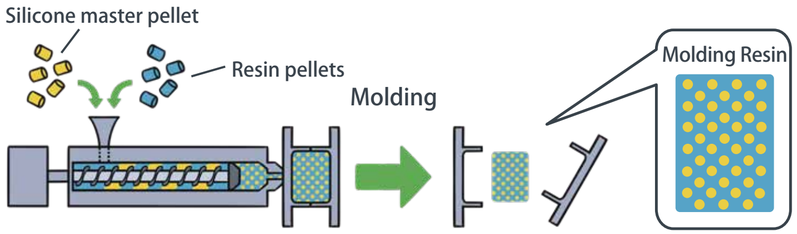
Product Usage

Resin Hybridization Agents

Contact Information → Sales and Marketing Department I
TEL. +81-3-6812-2406

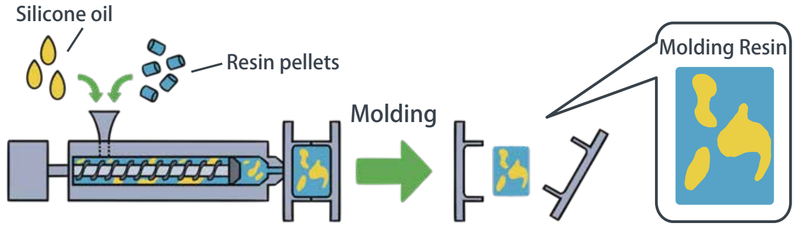
■ Features and Benefits

In the case of silicone master pellets…… Pellet input only



Uniform
Silicone Dispersion Resin
||
Improved molding efficiency

In the case of ordinary silicone oil …… Liquid dripping equipment is required



Uniform dispersion is difficult

■ Product Lineup

Parameter / Product name	Resin	Silicone content %	MFR g / 10 min	MFR test conditions
X-22-2101	PP (homo) polypropylene	50	33	210℃ / 2.16kg
X-22-2125H	LDPE (Low density) polyethylene	50	25	190℃ / 2.16kg
X-22-2138B	EVA Ethylene-vinyl acetate copolymer	40	5	190℃ / 2.16kg
X-22-2159	POM Polyacetal	40	55	190℃ / 2.16kg
X-22-2184-30	ABS Acrylonitrile-butadiene-styrene copolymer	30	50	210℃ / 2.16kg

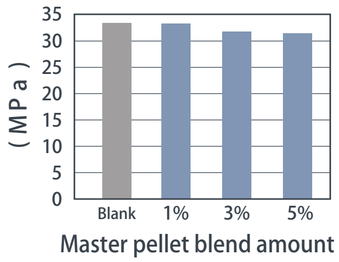
※The type of resin and silicone content can be adjusted. Please contact sales representative for more details. (Not specified values)

■ Applications

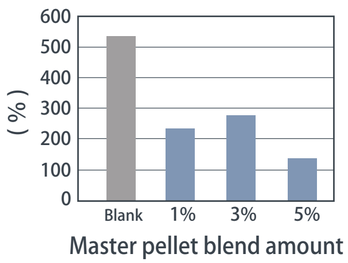
Applicable resin	Application examples	Properties obtained through modification
Polypropylene	Automotive products, home appliances, films	Lubricity, stain resistance, release properties
Polyethylene	Coating materials, films	
Polyacetal	Industrial machinery parts	

■ Test Data of Physical Property (PP Resin / X-22-2101)

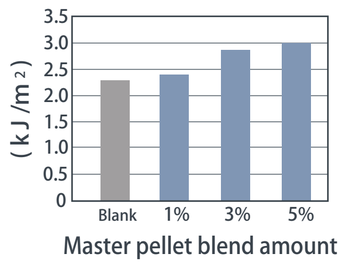
■ Tensile strength



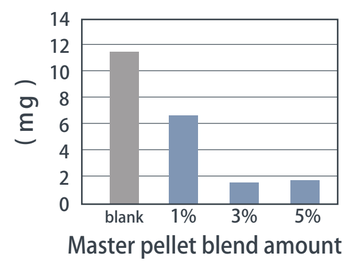
■ Nominal tensile strain at break



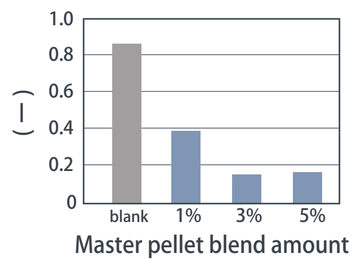
■ Charpy impact strength



■ Wear Mass



■ Dynamic friction coefficient (60 minutes)



Tensile test, nominal breaking strain: JIS K 7161-2 compliant
Charpy impact test: JIS K 7111-1 compliant
Wear mass, dynamic friction coefficient: JIS K 7218 A method compliant

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Product Usage

Resin Hybridization Agents

Flame Retardancy　High Transparency

Silicone-based Flame Retardants for Polycarbonate

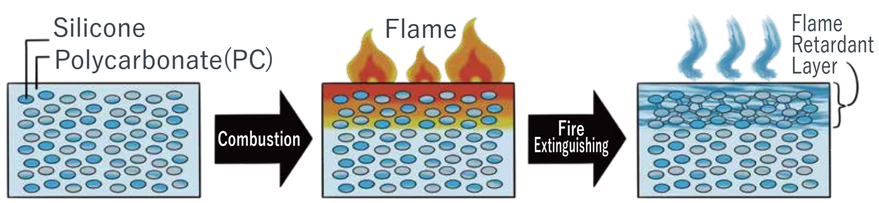
KR-2710 / KR-481 / KR-480

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- These silicones exhibit flame retardancy when used **in combination with a sulfonate.**
- **Formulated without fluorine additives**, it achieves **UL94 V-0 flame retardancy** while maintaining transparency.
- Compared to other flame retardants, the addition amount is small and it is less likely to decompose due to heat, making it possible to **design recyclable resins**.

■ Estimated Flame Retardant Mechanism



Excellent dispersibility
▶ Compatible and dispersible to PC

Phenyl group is carbonized.
Cross linking between PC and silicone.
▶ Flame retardant layer is formed.

■ General Properties

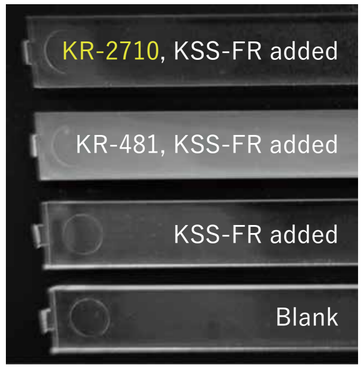
Item \ Product name	KR-2710	KR-481	KR-480
Functional groups	-Me/Ph/H	-Me/Ph	-Me/Ph
Structure	Straight chain	Branch	Branch
Appearance	Colorless transparent liquid	White flake	White flake
Active ingredient %	100	100	100
Softening point ℃	-	130	90
Refractive index	1.52	1.56※	1.54※
Viscosity mm²/s	50	-	-
Transparency when adding to PC	+(Transparent)	±(Relatively transparent)	-(Not transparent)

*Estimated value　(Not specified values)

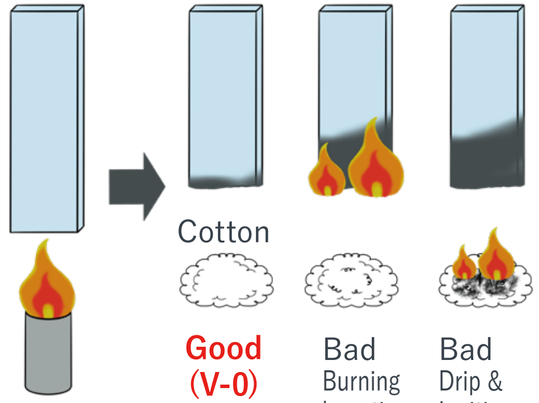
■ Transparency when Adding Polycarbonate

Compared to KR-481 (conventional product), **KR-2710 does not impair transparency** even when added to PC.

Test piece thickness : 2mm
Polycarbonate:
NOVAREX M-7027U



■ UL94 Combustion Test (Image Diagram)



■ Mixing Examples and Flame Retardant Test Results

Component	Product name	MVR	Test piece1	Test piece2	Test piece3	Test piece4
PC	TARFLON IR-2500*1	8	90	90	-	-
	NOVAREX M-7027U*2	3	-	-	90	90
	TARFLON FN-2200*1	12	10	10	10	10
Silicone	**KR-2710**		-	2	-	2
Additive	KSS-FR (Non-fluorine char catalyst)		0.2	0.2	0.2	0.2
	ADK STAB PEP-36 (Antioxidant)		0.1	0.1	0.1	0.1
	ADK STAB AO-50 (Antioxidant)		0.1	0.1	0.1	0.1
	RIKESTER EW-440A (Release agent)		0.1	0.1	0.1	0.1
Appearance of test pieces			Transparent	Transparent	Transparent	Transparent
UL94 Test result (Thickness = 3 mm)			V-2	**V-0**	-	-
UL94 Test result (Thickness = 2 mm)			Not applicable	V-2	V-2	**V-0**

* The unit is parts by mass.　*1 Made by Idemitsu Kosan Co.,Ltd
*2 Made by Mitsubishi Engineering-Plastics Corporation

(Not specified values)

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Low Cure Shirinkage

Flexibility Crack Resistance

Organofunctional Cyclic Siloxane Materials

Product Usage

Resin Hybridization Agents

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

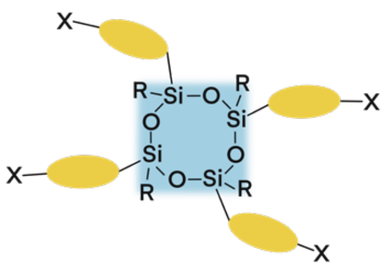
- Stress relaxation
- Reduced cure shirinkage

■ Applications

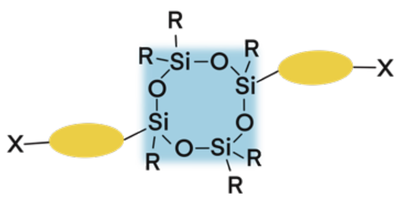
- Reactive binder
- Reactive diluent
- Cross-linker for resin modification

■ General Structures

【Tetra Functional Type】



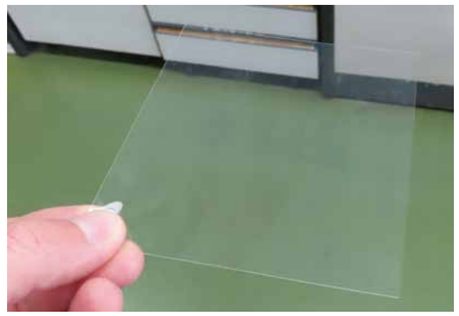
【Dual Functional Type】



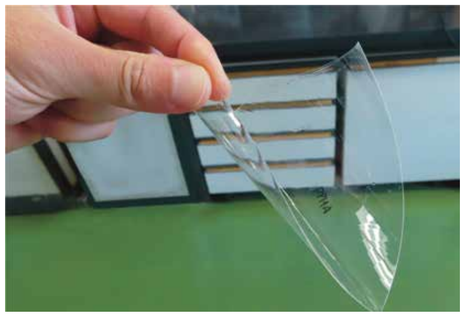
= Organic chain R = Alkyl Groups
X = Reactive Functional Groups

■ UV Cure Film Cure Shrinkage Relaxation Evaluation

X-48-5140B



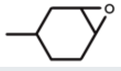
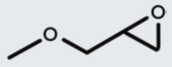
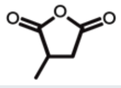
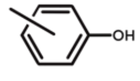
Comparison: DPHA (Hexafunctional acrylic)



A composition containing 2 wt% of a photoinitiator is applied to a PET film and cured at 600 mJ/cm² under N2 atmosphere.

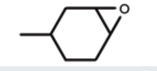
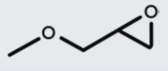
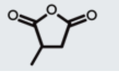
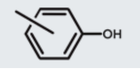
■ General Properties

【Tetra Functional Type】

Product name	Active ingredient %	Organic functional groups X	Functional group structure	Consistency at room temperature	Viscosity 25°C, mPa・s	Functional group equivalent g/mol
KR-470	100	Alicyclic epoxy		Transparent liquid	3,000	200
X-40-2701	100	Glycidyl		Transparent liquid	100	160
X-48-9670 PMA70	70 PGMEA solution	Succinic anhydride		Transparent liquid	500	270
X-48-1140	100	Primary alcohol	-CH_2-OH	Transparent liquid	100	190
X-48-5040P	100	Methacrylic		Transparent liquid	70	200
X-48-5140B	100	Acrylic		Transparent liquid	50	200
X-48-9504	100	Phenol		Transparent liquid	400,000	190

(Not specified values)

【Dual Functional Type】

Product name	Active ingredient %	Organic functional groups X	Functional group structure	Consistency at room temperature	Viscosity 25°C, mPa・s	Functional group equivalent g/mol
X-40-2678	100	Alicyclic epoxy		Transparent liquid	120	290
X-40-2728	100	Glycidyl		Transparent liquid	30	270
X-48-6942	100	Primary amine	-CH_2-NH_2	Transparent liquid	30	250
X-48-9672	100	Succinic anhydride		Transparent liquid	2,400	300
X-48-1142	100	Primary alcohol	-CH_2-OH	Transparent liquid	100	260
X-48-5042P	100	Methacrylic		Transparent liquid	16	310
X-48-5142B	100	Acrylic		Transparent liquid	20	310
X-48-9502	100	Phenol		Transparent liquid	1,000	250

(Not specified values)

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Flexibility
Crack Resistance

Water Repellency
Antifouling Property

Weather Resistance

Water Repellent, Stain Resistant, High Weather Resistant Hydroxyl Group-Containing Silicone Modifier

Product Usage

Resin Hybridization Agents

X-48-1900 Series

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- These are silicone oligomers containing alcoholic hydroxyl groups.
- Resin modification is possible by simply mixing at room temperature (cold blending), eliminating the need for large synthesis equipment.
- It has excellent resin compatibility and is unlikely to bleed out or separate during curing.

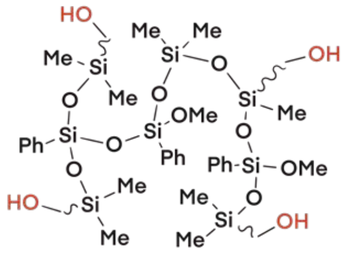
■ Applications

- Resin modifier

■ Applicable Resins

- Polyurethane
- Polyester
- Melamine resin, etc.

■ Structure Model

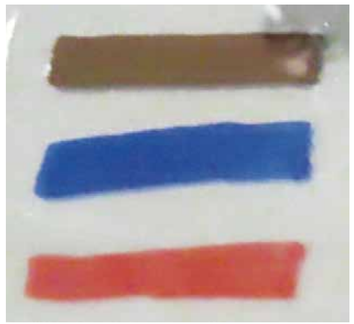
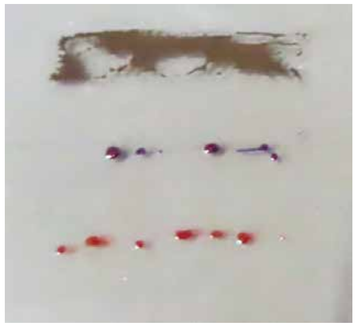


■ General Properties

Product name	X-48-1901	X-48-1903L	X-48-1904S
Imparting properties	Flexibility Adhesion	Water repellency Stain resistance	Weather resistance
Additional properties	Excellent compatibility	Reduced addition amount	Excellent compatibility
Appearance	Colorless transparent liquid	Slightly white cloudy liquid	Colorless transparent liquid
Active ingredient %	100	100	50
Viscosity at 25℃ mm^2/s	1,000	4,000	20
Solvent	Not contained	Not contained	Toluene
Recommended addtion amount wt%	1~10	0.5~5	5~50
Water solubility (Appearane of 50% water solution)	Good (Dispersion)	Bad (Precipitation)	Bad (Separation)

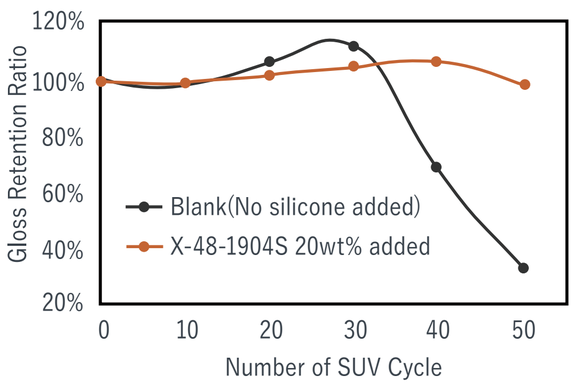
(Not specifed values)

■ Antifouling / Water Repellency Test

Item \ Conditions	Non additive	X-48-1903L 1wt % added
Appearance		
Water contact angle 2μL °	90	101

【Test conditions】 Paint:2-component polyurethane paint (Not specified values)
Film thickness:14μm, Substrate:glass plate
Write with permanent marker Mackey (manufactured by Zebra Co., Ltd.)

■ Weather Resistant Test (Gloss Retention Ratio)



【Test conditions】
Paint:2-component polyurethane paint
Film thickness:30μm
Substrate:Polyesther coated steel plate
Gloss retention ratio:
Calculated from 60 degree specular gloss measurement
SUV test:
1 cycle=UV(90mW)irradiate for 4h
→Darkness 4h→Condensation 4h
※10 cycles equals one year's worth of UV irradiation

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Silicone Powder

Product Usage

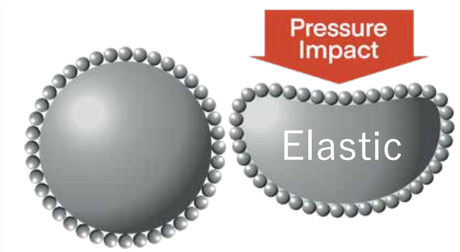
Resin Hybridization Agents

Surface Modifiers for Coating

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

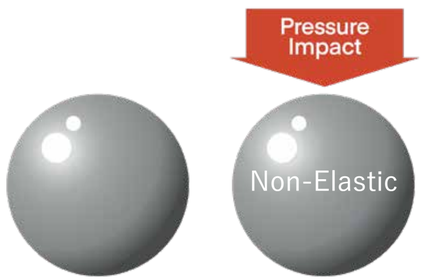
3 Types of Products

Hybrid Silicone Powder



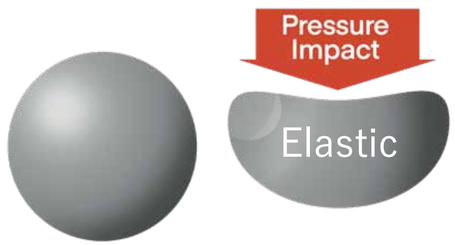
Composition:
Rubber powder coated with resin particles

Silicone Resin Powder



Composition:
Three-dimensional
crosslinked product

Silicone Rubber Powder



Composition:
Crosslinked product
of linear molecules (silicone)

How to Use

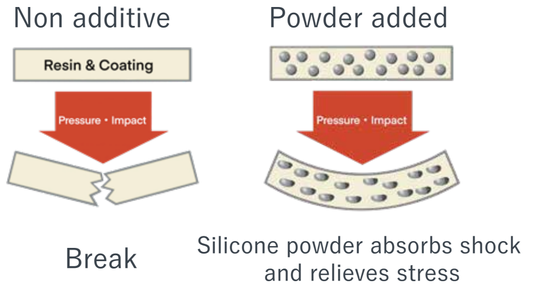
- Used by adding to resins, coating agents, etc.
- Recommended addition amount (estimate): 1~10wt%

Applications

- For synthetic resin:
  They improve impact resistance and abrasion resistance and add light diffusivity, etc.
- For paints, inks and coatings:
  They improve surface slipperiness, flexibility (feeling) and matte properties, etc.

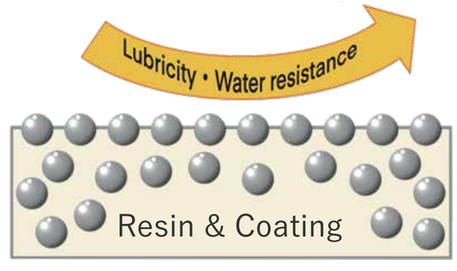
Enhanced Properties

Stress Relaxation Impact Resistance



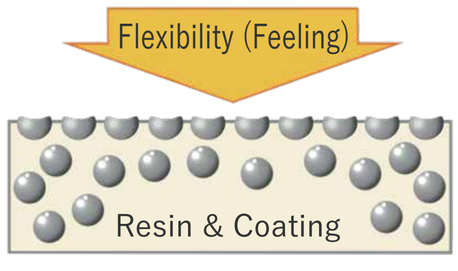
Hybrid Silicone Powder	++
Silicone Resin Powder	±
Silicone Rubber Powder	++

Surface Slipperiness Abrasion Resistance



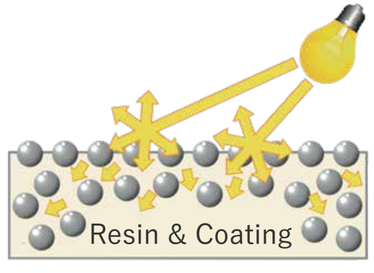
Hybrid Silicone Powder	++
Silicone Resin Powder	++
Silicone Rubber Powder	+

Flexibility (Feeling)



Hybrid Silicone Powder	++
Silicone Resin Powder	-
Silicone Rubber Powder	++

Light Diffusivity Matte Property



Hybrid Silicone Powder	++
Silicone Resin Powder	++
Silicone Rubber Powder	++

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Adhesion

Cyclic Carbonate Type Silane Coupling Agent

Produt Usage

Surface Modifiers for Pigments & Fillers

X-88-476

Contact → Sales and Marketing Department II
Phone : +81-3-6812-2407

■ Features and Benefits

- A silane coupling agent with a cyclic carbonate structure.
- CO2 is effectively utilized as a raw material.
- It improves adhesion between fillers such as glass fiber and resin.
- By retaining cyclic carbonate, it is possible to create a stable aqueous solution.
- It reacts with amines to form urethane structures with OH groups.

■ Applications

- Resin additives (improving adhesion)
  Applicable resin:
  Epoxy, polycarbonate, urethane, nylon, acrylic, phenol, melamine, polyester, polyimide, etc.

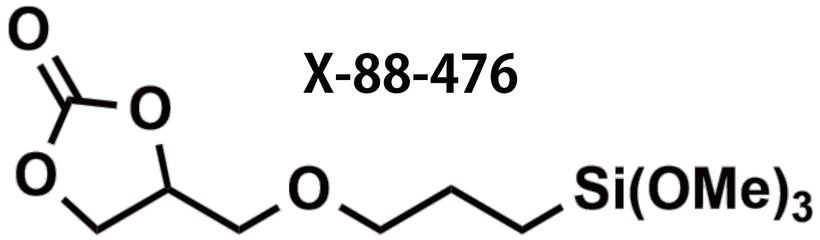
■ General Properties

Parameter \ Product name	X-88-476
Applicable solvent	Organic solvent type, water type
Solvent type	Solvent free
Usage	Additives
Organic functional group	Cyclic carbonates

(Not specified values)

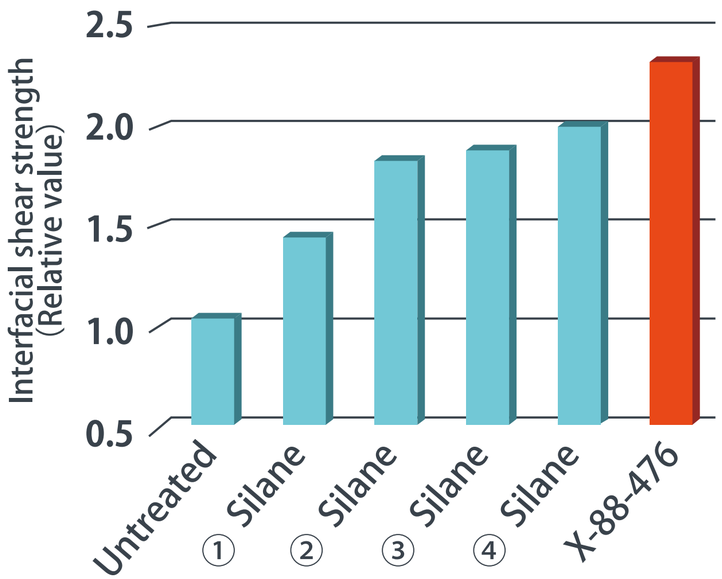
■ Chemical Structure

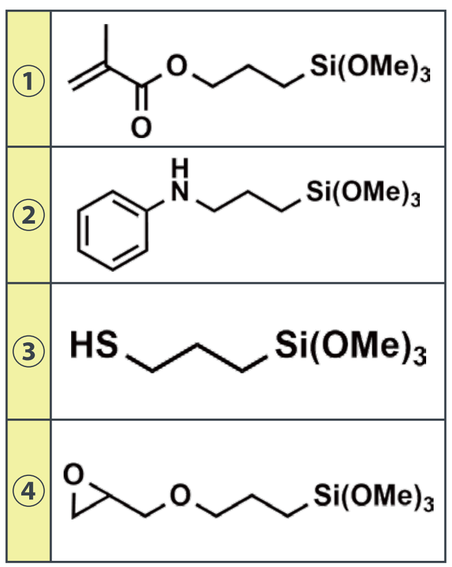
X-88-476



■ Improved Adhesion between Glass and Epoxy Resin

Glass fiber is treated with 1wt% silane solution.
Evaluation by microdroplet method.





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High Productivity | LMW Si Reduction | Labor Saving
Process Cost Reduction | Energy Saving | Injection Molding Compatible

Development Products

No Post Cure Silicone Rubber Compounds

Product Usage

Silicone Rubbers for Molding

KNP-5xx-U Series

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2408

■ Features and Benefits

1) The amount of low molecular weight (LMW) siloxane has been significantly reduced, and excellent performance is achieved without the need for post cure.
2) Eliminating the post cure process contributes to improved productivity and cost reduction.

■ Applications

Automotive and electronic equipment parts, tubes, and all other silicone rubber molded products

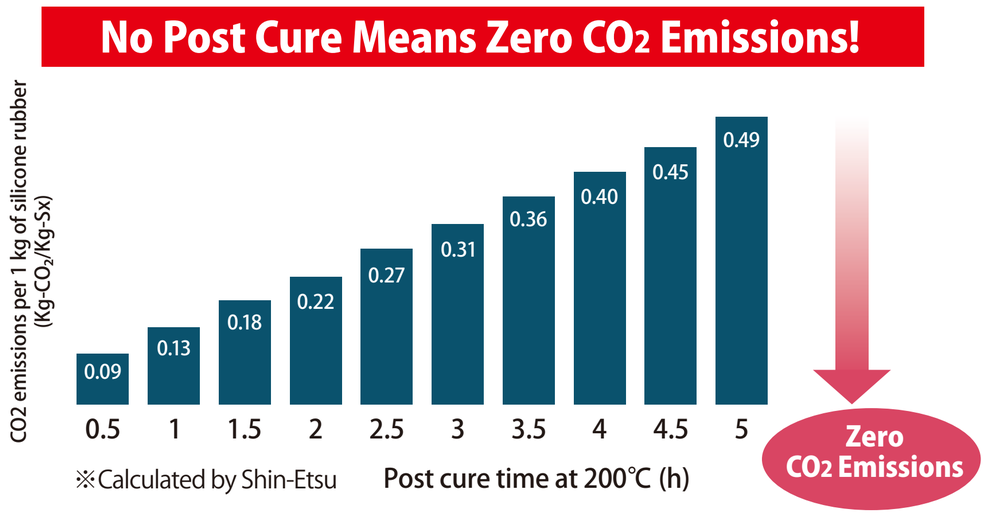
■ General Properties

Type			For extrusion molding		
Parameter \ Product Name			KNP-541-U	KNP-551-U	KNP-561-U
Appearance			Milky white translucent	Milky white translucent	Milky white translucent
Plasticity			147	208	327
Curing Agent	Curing agent name		X-93-1893-A/B		
	Adding quantity	phr	0.5/2		
Standard curing conditions	Primary cure		120℃×10 min		
	Post cure		Not required		
Hardness Durometer A			41	50	61
Density at 23℃		g/cm³	1.09	1.14	1.19
Tensile strength		MPa	7.1	10.6	12.1
Elongation at break		%	550	610	630
LMW siloxane content $\Sigma D_3 \sim D_8$		ppm	350>	350>	350>

(Not specified values)

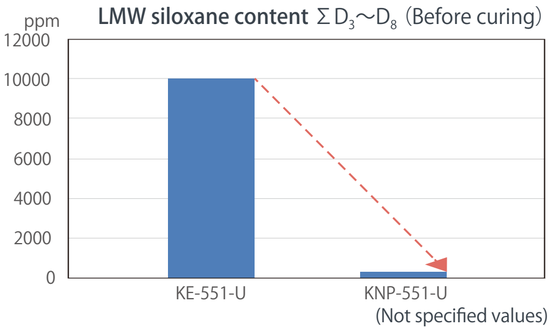
■ CO_2 Emissions from Post Cure

No Post Cure Means Zero CO_2 Emissions!



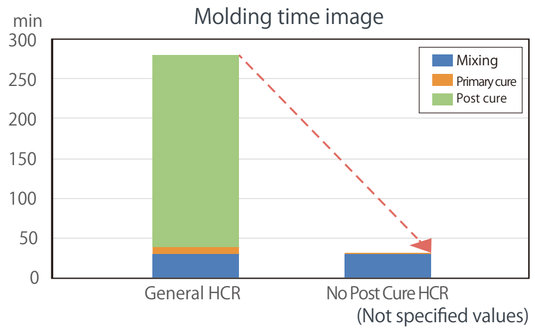
■ Low Molecular Weight Siloxane Content was Reduced by Approximately 95%.

Low molecular weight (LMW) siloxane content has been significantly reduced compared to conventional HCR. This ahieves countermeasure against LMW siloxanes and shortening the process.



■ Production Time can be Reduced by Approximately 90%

When comparing the production time for 2mm thick sheets under our recommended molding conditions, the molding time can be reduced by approximately 90% compared to conventional HCR.



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Flame Retardancy | Low Smoke | Low Heat Loss (Sintering)

EN 45545-2 European Vehicle Fire Safety Standards | Dimensional Stabiliry | Extrusion Molding

Fire-resistant, Low Smoke and Flame-retardant Silicone Rubber Compounds

Product Usage

Silicone Rubbers for Molding

KE-1735-U, KE-5612E-U

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2408

■ Features and Benefits

- High dimensional stability when heated and low smoke emission
- When burned, it sinters like a ceramic.
- EN-45545-2 (R1/R7) standards certification

■ Application Examples

- Fireproof gasket certification for transport aircraft and underground facilities

Excellent Fire Resistance and Low Smoke Emission Millable Molding Silicone Rubber KE-1735-U

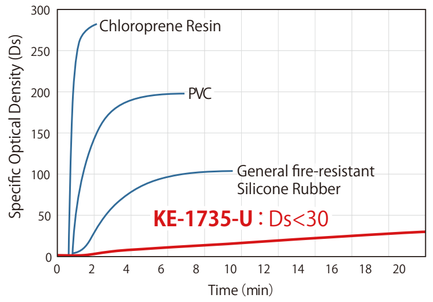
■ General Properties

Parameter		Product name KE-1735-U
Appearance		Grayish black
Williams plasticity (10 min after remix)		350
Curing Agent	Curing agent name	C-23N
	Adding quantity	1.3
Standard curing conditions	Primary cure	120℃×10min
	Post cure	200℃×4h
Hardness Durometer A		71
Density at 23℃	g/cm³	1.47
Tensile strength	MPa	6.1
Elongation at break	%	220
Tear strength Crescent piece	kN/m	12
Compression set 100℃×22h	%	13
Oxygen index	%	51

(Not specified values)

■ Smoke Generation Evaluation

Compared to conventional products and other resins, it produces less smoke and makes it easier to maintain visibility in the event of a fire.

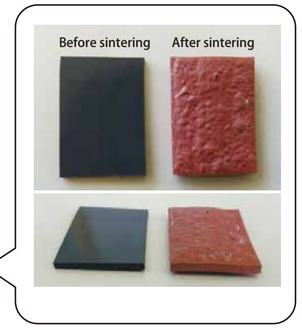


※Not specified values

■ Weight Retention and Appearance Change of Sintered Body

A 2mm thick sheet piece was placed in an 800℃ furnace for 5 minutes and compared with the condition before sintering.
We found that there was little weight change or foaming.

Weight retention of sintered body	800℃×5 min	85%



UL-94 V-0 Flame-retardant Silicone Rubber KE-5612E-U

■ General Properties

Parameter		Product name KE-5612E-U
Frame resistance : UL-94		V-0
Curing Agent	Curing agent name	C-3
	Adding quantity	1.3
Standard curing conditions	Primary cure	165℃×10min
	Post cure	200℃×4h
Appearance		Grayish black
Williams plasticity (10 min after remix)		230
Density	g/cm³	1.49
Linear shrinkage	%	2.7
Hardness Durometer A		60
Tensile strength	MPa	7.2
Elongation at break	%	290
Tear strength Crescent piece	kN/m	13
Compression set 180℃×22h		16
Dielectric breakdown strength Normal	kV	27
Volume resistivity Normal	TΩ・m	240

(Not specified values)

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High Voltage Resistance | Flexibility | Flame Retardancy
Heat Resistance | Cold Resistance | Weather Resistance

Development Products

Molding Silicone Rubber for High Voltage Cable Covering Materials

KE-5641-U, KE-5643-U

Product Usage

Silicone Rubbers for Molding

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2408

■ Featues and Benefits

- High dielectric breakdown strength ensures insulation performance even when the cable coating layer is thin. It improves cable flexibility and enables smaller diameters and lighter weight.
- The dielectric breakdown strength of the high voltage type KE-5641-U is approximately 40kV/mm. (approximately 54% improvement over our previous model)
- The flame-retardant type KE-5643-U has flame retardancy equivalent to UL94 V-1, and its dielectric breakdown strength is approximately 37kV/mm (approximately 42% improvement over our previous model).

■ General Properties

Type		High Voltage Resistance (Development product)	Flame-retardant (Development product)	General-purpose (Development product)
Parameter \ Product name		KE-5641-U	KE-5643-U	KE-1265-U
Plasticity		320	480	215
Curing agent	Curing agent name	C-23N	C-23N	C-23N
	Adding quantity	1.3	1.3	1.3
Standard curing conditions	Primary cure	120℃×10min	120℃×10min	120℃×10min
	Post cure	150℃×1h	150℃×1h	150℃×1h
Hardness Durometer A		74	75	65
Density at 23℃	g/cm^3	1.32	1.35	1.21
Tensile strength	MPa	8.8	8.2	8.2
Elongation at break	%	340	280	300
Tear strength Crescent piece	kN/m	12	10	12
Volume resistivity	TΩ・m	100	200	50
Dielectric breakdown strength	kV/mm	40	37	26
Frame resistance UL94		—	V-1 equivalent	—

(Not specified values)

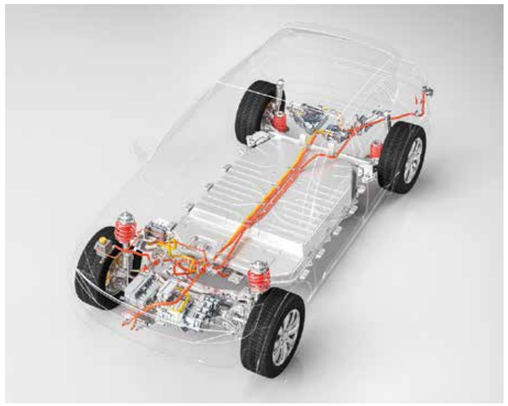
■ Application Examples

- Covering high voltage cables for electric vehicles (EV, HEV)
- Covering of high voltage cables for other industrial equipment, railways, energy plants, etc.

■ Comparison with Other Materials for High Voltage Cables

Features \ Rubber type	Silicone Rubber	Polyethylene	Acrylic Rubber	Ethylene Propylene Rubber	Fluorine Rubber
Flexibility	++	±	++	++	++
Heat resistance	++	±	+	-	++
Cold resistance	++	+	±	+	-
Electrical properties (Insulation)	++	+	±	+	+
Flame retardancy	++	+	+	+	++
Oil resistance	+	+	+	±	++
Mechanical Strength	±	+	+	+	+

(Not specified values)



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LMW Si Reduction | Oil Bleed | Low Compression Set | Process Shortening | FDA・BfR Compliance | No Burrs Runner-less

No Post Cure LIMS
(Liquid Injection Molding System)

Product Usage

Silicone Rubbers for Molding

KE-2017 Series, KE-2019 Series, KEG-2003H Series

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2408

■ Features and Benefits

- Since the amount of low molecular weight (LMW) siloxane is reduced, post cure using a dryer is not required.
- Oil-bleed type, low compression set type, FDA, BfR compliant type available
- Improved mold contamination during molding, less fluctuation in shrinkage rate

■ Application Examples

- Waterproof seals for wire harnesses, gaskets, packing, O-rings, food contact products, etc.

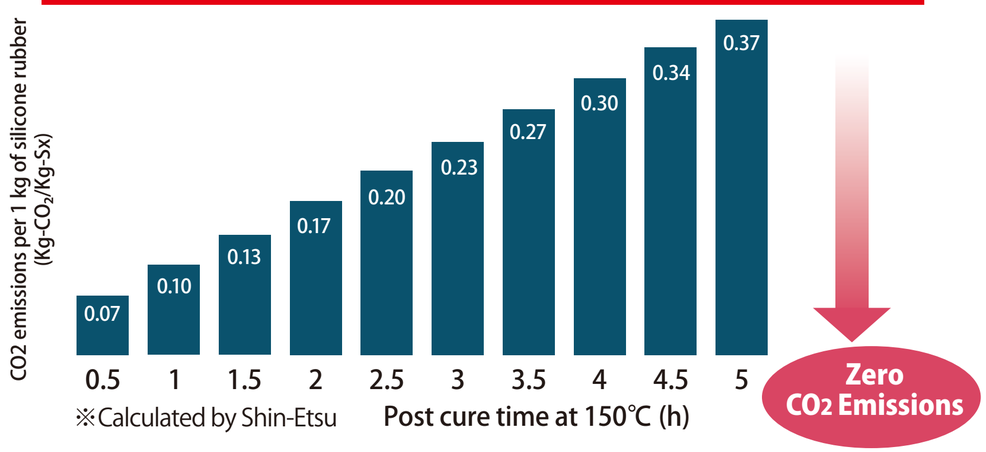
■ General Properties

Type			Oil Bleed	Low Compression Set	Compliance with Food Standards(FDA, BfR)
Parameter		Product Name	KE-2017-40-A/B	KE-2019-40-A/B	KEG-2003H-40-A/B
Appearance			Translucent	Translucent	Translucent
Viscosity (A/B)		Pa・s	1,790/1,550	327/334	900/960
Curing speed at 130℃ (MDR)	T10	s	35	31	23
	T90	s	76	78	45
Standard curing conditions	Primary cure		150℃×10min	150℃×10min	150℃×5min
	Post cure		Not required	Not required	Not required
Hardness Durometer A			43	40	41
Density at 23℃		g/cm³	1.14	1.12	1.13
Linear shrinkage at 150℃		%	2.4	2.5	2.5
Tensile strength		MPa	9.0	9.5	9.1
Elongation at break		%	620	670	830
Tear strength Angle piece		kN/m	34	31	36 ※1
Compression set 150℃×70h		%	18	14	15 ※2
LMW siloxane content $\Sigma D_3 \sim D_8$		ppm	350>	350>	350>
Rubber hardness lineup Durometer A			20～50	30～60	30～70

※1 Crescent ※2 Curing conditions：150℃×15min, test conditions120℃×22 h (Not specified values)

■ CO_2 Emissions from Post Cure

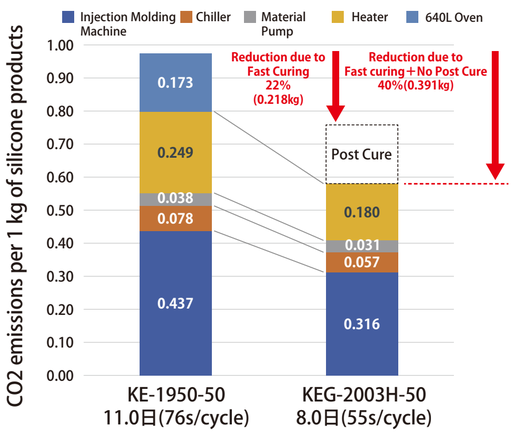
No Post Cure Means Zero CO_2 Emissions!



※Calculated by Shin-Etsu

■ CO_2 Emissions Per kg of Product during LIMS Molding

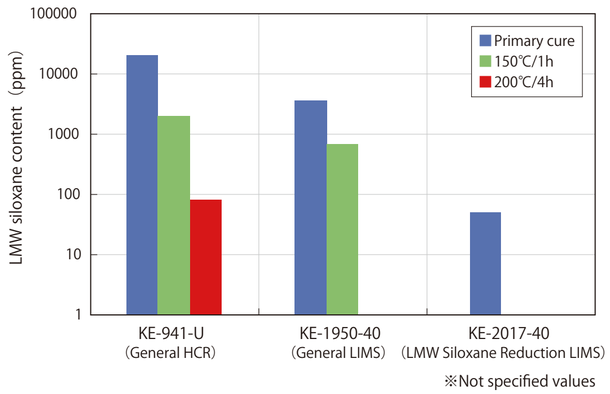
(Convert electricity consumption into CO_2)



※Calculated by Shin-Etsu

■ Comparative Data on LMW Siloxane Content by Solvent Extraction Method

It reduces the amount of low molecular weight (LMW) siloxane, lowers the risk of contact failure, and shortens the production process.



※Not specified values

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High Transparency · Heat Resistance · Weather Resistance · Frexibility · LMW Siloxane Countermeasure

Highly Transparent LIMS for Optical Components (Liquid Injection Molding System)

KE-2063 Series

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2408

Features and Benefits

- Highly transparent molding material with the flexibility of rubber and the heat and weather resistance
- Lightweight and highly designable, it can also mold transparent components with complex shapes.
- AMECA equivalent

Application Examples

- Optical components that require heat resistance and transparency, such as light guide components for headlamps and LED lighting

Comparison with Other Highly Transparent Materials

- Lightweight, Flexible and Heat Resistant -

Parameter \ Material	KE-2063 Series	Glass	PC	Acrylic
Total light transmittance %	95	91	89	93
Density at 23℃ g/cm³	1.04	2.50	1.20	1.10
Use temperature ℃	200	>200	120	80
Weather resistance	+	+	-	±
Flexibility	+	-	-	-

(Not specified values)

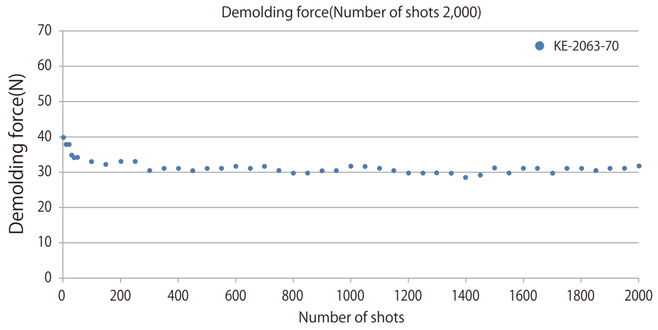
General Properties

Parameter \ Product name		KE-2063-70-A/B	KE-2063-80-A/B
Standard curing conditions	Primary cure	120℃×10min	120℃×10min
	Post cure	150℃×1h	150℃×1h
Hardness Durometer A		70	78
Density at 23℃	g/cm³	1.06	1.08
Tensile strength	MPa	—	—
Elongation at break	%	93	82
Tear strength	kN/m	10	8
Total light transmittance 2mm	%	94	94
Refractive index 25℃		1.41	1.41
HAZE 2mm	%	3	3

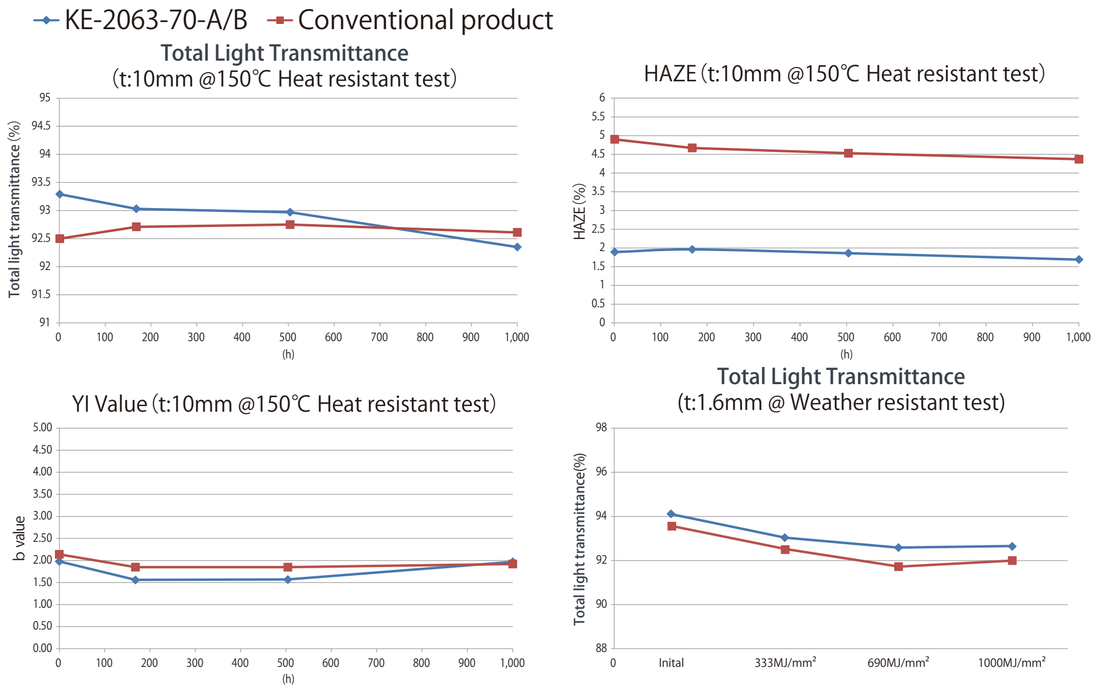
(Not specified values)

Continuous Molding

Stable long-term continuous molding is possible.



KE-2063-70-A/B Optical Property Durability Test



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Primer-less | Automation | Process Shortening | Good Adhesion | Low Cost | No Burrs Runner-less

Self-adhesive LIMS
(Liquid Injection Molding System)

Product Usage

Silicone Rubbers for Molding

KE-2097 Series, KE-2098 Series

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2408

■ Features and Benefits

- Adhesion to PC, PBT, PA, and metals without primer
- Adhesive application or post cure is not required.
  It contributes to shortening the process and reducing costs.

■ General Properties

Type			PC / PBT Adhesion Compliant to FDA	PA / Metal Adhesion
Parameter		Product name	KE-2097-50-A/B	KE-2098-50-A/B
Appearance			Translucent	Translucent
Viscosity 0.9s-1		Pa・s	500/546	890/856
Hardness 130℃ (MDR)	s	T10	21	24
		T90	47	54
Standard curing conditions		Primary cure	150℃×5min	150℃×5min
		Post cure	Not required	Not required
Hardness Durometer A			47	47
Density at 23℃		g/cm³	1.13	1.15
Tensile strength		MPa	9.7	8.5
Elongation at break		%	700	610
Tear strength Crescent piece		kN/m	34	36
Rubber hardness lineup Durometer A			30 to 60	40 to 60

(Not specified values)

■ Application Examples

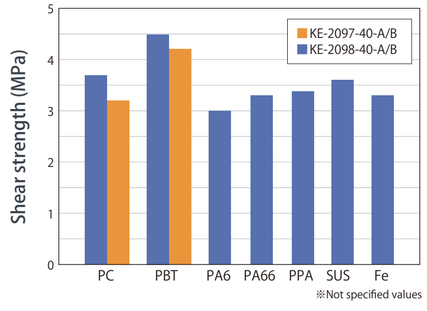
- Composite parts made of silicone rubber, resin, and metal

■ (Development Products)
Low Temperature Fast Curing Type X-34-4382-A/B

Parameter	Product name	KE-2090-40-A/B (Conventional product)	X-34-4382-A/B
Shear viscosity 0.9 s-1 A/B	Pa・s	521/1070	720/1320
Curing speed at 120℃; T10/T90	sec	37/76	21/42
Curing speed at 110℃; T10/T90	sec	100/169	37/62
Density	g/cm³	1.11	1.14
Hardness (Type-A)		36	40
Tensile strength	MPa	7.9	8.0
Elongation at break	%	670	550
Compression set ; 150℃/22h	%	72	32
Compression set ; 120℃/70h	%	54	20
Shear adhesion strength ; PC	MPa	3.6	3.0
Shear adhesion strength ; PBT Curing conditions:120℃/10min	MPa	4.5	3.5

(Not specified values)

■ Shear Adhesive Strength to Various Substrates

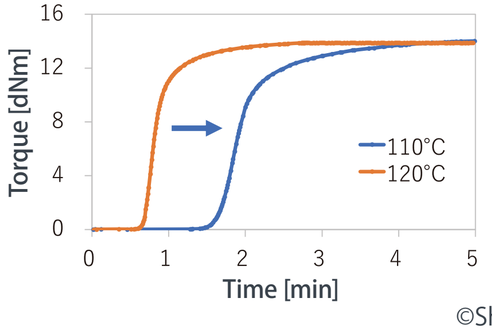


※Not specified values

■ Molding Temperature

Substrate	Molding temperature
PBT	～150℃
PC	～130℃

■ KE-2090-40-A/B (Conventional Product) Curability



Low temperature fast curing
→Shortening of molding cycle

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Heat Resistance | Cold Resistance | Flame Retardancy | Electrical Insulation

Heat-Shrinkable Rubber Tubing

ST-OR Series

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2409

■ Features and Benefits

- When heated, the inner diameter easily shrinks, covering the target object.
- It has excellent heat resistance, cold resistance, and flame retardancy.
- It has excellent electrical properties.
- Maintains moderate softness.

■ Applications

- Electrical insulation covering for busbars (vehicles, power stations, elevators, etc.)
- Wiring, heater, and sensor protection for various semiconductor devices
- Polyethylene fusion method (mold material)

■ General Properties

Parameter \ Type		ST-OR
Appearance		Orange (RAL2003)
Volume resistivity ※	Ω・m	1.8×10^{16}
Breakdown strength ※	kV/mm	28
Dielectric constant ※	(ε) 50Hz	3.4
Dielectric dissipation factor ※	(tanδ) 50Hz	0.005
Usage temperature range	℃	-40 ~ + 200
Shrinkage (in direction of diameter)	%	40
Shrinkage temperature	℃	80 ~ 200

※Sheet properties measured at 1mm thickness (Not specified values)

■ Work Process

1) Size selection

Please contact sales representative for product sizes.
As a rule of thumb, select a tubing whose post-shrink bore diameter is slightly smaller than that of the object to be covered.

2) Fitting

Cut the tubing to the appropriate length for the object being covered.
It can be cut easily with a utility knife or scissors.

3) Heating

Slip the tubing over the object being covered, then heat evenly to shrink.
Tubing should be heated to between 80℃ to 200℃.

The inner diameter easily shrinks when heated.

Busbars covered with ST-OR sereis

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UV Cure

UV Radical Polymerization Type Liquid Silicone Rubbers

Product Usage

Liquid Silicone Rubbers

Contact → Sales and Marketing Department IV
Phone : +81-3-6812-2410

■ Featues and Benefits

- UV curing is possible in the atmosphere.
- Maintains stable physical properties over a wide temperature range (-40℃ to 150℃).
- No heat curing is required, contributing to carbon neutrality.

■ Applications

- Adhesion of various precision parts

■ Comparison with Conventional Products

- **Conventional UV Radical Polymerization Type Liquid Silicone Rubbers**

  Since curing is inhibited by oxygen,
  UV curing in a nitrogen atmosphere is required.

- **UV Radical Polymerization Type Liquid Silicone Rubbers X-32-4105-2UV、X-32-4208-UV-1**

  There is no need to create a nitrogen atmosphere, and UV curing is possible in the atmosphere.

■ General Properties

Parameter \ Product name		X-32-4105-2UV	X-32-4105-2UV-F1	X-32-4208-UV-1
Viscosity	Pa・s	1.2	49	3.2
Hardness	Durometer A	80	80	30
Tensile lap-shear strength※ (Glass/Glass)		1.9	1.5	0.9

※Tensile lap-shear strength was evaluated after UV irradiation and leaving it at room temperature for one day.

(Not specified values)

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3D Print Material

Liquid Silicone Rubber for 3D Printers

KED-5000G

Contact → Sales and Marketing Department IV
Phone : +81-3-6812-2410

Features and Benefits

- This product can be cured with 365 nm or 405 nm UV-LED
- High elasticity • Low odor
- 200℃ Heat resistance

Applications

- Compatible to SLA, DLP, LCD etc.
- 3D printing metal mold with 3D hollow structure
- Various complex structure silicone molded products

General Properties

Parameter \ Product name	KED-5000G
Appearance	Gray
Viscosity mPa・s	1,620
Hardness Durometer A	51
Tensile strength MPa	6.3
Elongation at break %	94
Density g /cm³	1.04
Cure shrinkage %	0.3

(Not specified values)

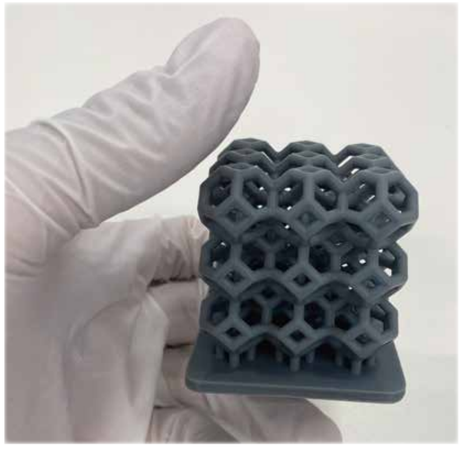
KED-5000G Heat Resistance (Initial / 150℃ / 200℃)

Parameter \ Conditions	Initial	150℃ × 500 h	200℃ × 72 h
Hardness Durometer A	53	54	52
Tensile strength MPa	6.4	7.2	5.6
Elongation at break %	103	94	90

(Not specified values)

Appearance of Moldings

This product can be molded into a variety of shapes.



Soft silicone rubber can be molded.

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Adhesion | Low Out Gas | Electrical Insulation | Heat Resistance | Cold Resistance

Liquid Silicone Rubber for Aerospace Applications Low Outgassing Products

One-component Room Temperature Cure Coating / Sealing Materials

Contact → Sales and Marketing Department IV
Phone : +81-3-6812-2410

【Low Outgassing Products】
Out gas test：Meeting ASTM-E-595 standards.　TML※：≦1.0%　CVCM※：≦0.1%
※TML = Total Mass Loss　CVCM = Collected Volatile Condensable Materials

■ Features and Benefits

- One-component ready to use
- Room temperature cure type
- It has good adhesion to resin, glass, metal, etc.
- There is no cure inhibition.
- There is a wide variety of viscosities available.
- It has excellent electrical insulation, cold resistance, and heat resistance.

■ Applications

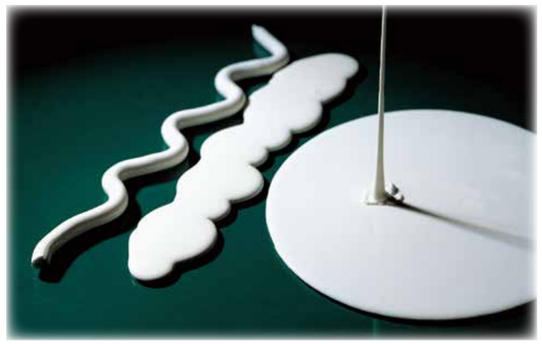
- Moisture-proof and insulating coating for electrical and electronic components, adhesives and sealants for fixing components

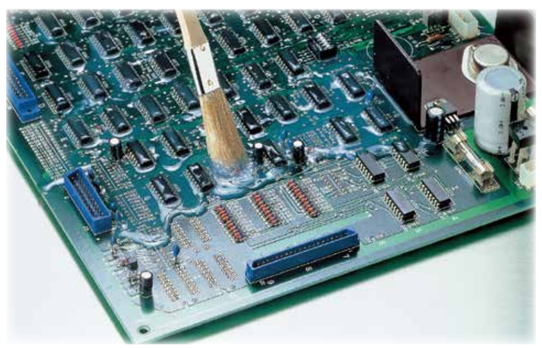
■ General Properties

Parameter \ Product name			SCK-3003	SCK-3005	SCK-3006	KE-4908SC-T
Applications			Electrical insulation coating		Adhesive / sealing	
Reaction mechanism			Condensation	Condensation	Condensation	Condensation
Before Curing	Appearance		Cloudy pale yellow	Transparent yellow	Cloudy white	Translucent
	Viscosity at 23℃	Pa・s	1.3	5.4	90	Paste
	Recommended curing conditions		23±2℃ / 50±5%RH ×7days			
After Curing	TML	%	0.290	0.147	0.197	0.396
	CVCM	%	0.011	0.004	0.003	0.008
	Density at 23℃	g/cm³	0.99	0.98	1.01	1.08
	Hardness	Durometer A	19	18	24	46
	Volume resistivity	TΩ・m	15	51	88	80
	Dielectric breakdown strength	kV/mm	23	26	26	26

(Not specified values)


Can be considered for aerospace applications


Wide variety of viscosities available


Electrical insulation coating

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Adhesion | Low Out Gas | Electrical Insulation | Heat Resistance | Cold Resistance | Heat Dissipation

Liquid Silicone Rubber for Aerospace Applications Low Outgassing Products

Product Usage

Liquid Silicone Rubbers

Thermal Interface Materials

Contact → Sales and Marketing Department IV
Phone : +81-3-6812-2410

Two-component Room Temeprature Cure Potting Agents

Featues and Benefits

- After mixing the two components, it cures at room temperature.
- Cures at room temperature, so there is little thermal impact on the base material.
- It has excellent electrical insulation properties.
- It has excellent cold and heat resistance.
- SCK-4193-A/B is a rapid cure type.

Applications

- Potting, bonding and sealing of electrical and electronic components

General Properties

	Parameter \ Product name	SCK-4193-A/B	KE-101-A/B
	Reaction mechanism	Addition	Addition
Before Curing	Applications	A : Black B : Creamy white translucent	A / B:Transparent
	Viscosity at 23℃ Pa・s	Mixed viscosity : 5.0	Mixed viscosity : 7.0
	Mix ratio	A : B / 100 : 100	A : B / 100 : 100
	Recommended curing conditions	23℃×1day	23℃×3days
After Curing	TML %	0.379	0.357
	CVCM %	0.074	0.057
	Viscosity at 23℃ g/cm³	0.99	1.02
	Hardness Durometer A	10	40
	Volume resistivity TΩ・m	8.5	13
	Dielectric break down strength kV/mm	25	27

(Not specified values)

Thermal Interface Materials【Adhesive / Potting Agents】

Features and Benefits

- It has high thermal conductivity and promotes heat dissipation from heat sources.
- It has good adhesion to resins, metals, etc.
- There is a wide variety of viscosities available.
- It has excellent electrical insulation properties.
- It has excellent cold and heat resistance.

Applications

- Heat dissipation bonding and potting for electrical and electronic components

General Properties

	Parameter \ Product name	SCK-4000	SCK-3400	SCK-4050	SCK-201-A/B	SCK-301-A/B
	Applications	Heat dissipation adhesive Electrical insulation			Heat dissipation potting Electrical insulation	
	Thermal Conductivity W/m・k	0.85	2.4	2.4	2.1	3.1
	Reaction mechanism	Condensation	Condensation	Condensation	Addition	Addition
Before Curing	Appearance	White	White	White	A/B mixed : Gray	A/B mixed : Gray
	Viscosity at 23℃ Pa・s	Paste	100	Paste	Mixed viscosity : 8 .8	Mixed viscosity : 20.0
	Mix ratio	—	—	—	A:B/100:100	A:B/100:100
	Recommended curing conditions	23±2℃ / 50±5%RH ×7 days			120℃×1h	
After Curing	TML %	0.267	0.101	0.157	0.189	0.173
	CVCM %	0.063	0.026	0.029	0.067	0.065
	Viscosity at 23℃ g/cm³	1.68	2.90	2.65	2.78	2.99
	Hardness Durometer A	80	91	88	17	16
	Volume resistivity TΩ・m	4.5	5.9	1.0	0.1	0.3
	Dielectric break down strength kV/mm	27	25	25	17	17

(Not specified values)

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Heat Dissipation | Misalignment Resistance | Stress Relaxation

Thermal Interface Gap Filler

SDP Series / Gel Grease

Contact → Sales and Marketing Department IV
Phone : +81-3-6812-2410

■ Features and Applicable Parts

- It has excellent misalignment resistance and will not occur misalignment even if applied thickly or placed vertically.

SDP Series :
Two-component Room Temperature Addition Cure Type

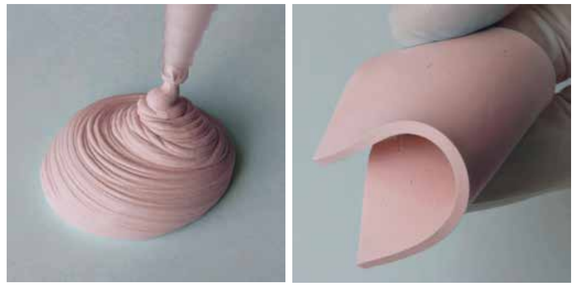
- Areas where stress relief is required using the cushioning properties of the material
- Areas with unevenness (excellent conformability)
- Parts that require reworkability

Gel Grease : One-component Non-curing Type

- It does not require curing and can be applied to surfaces of various shapes.

■ Consistency

SDP Series



Before curig : Grease-like and wet well to the substrate surface

Gel Grease

Soft grease

■ General Properties

SDP Series : Two-component Room Temperature Addition Cure Type

Parameter \ Product name		SDP-5040-A/B	SDP-6560-A/B	SDP-8070-A/B	SDP-9550-A/B	SDP-X160-A/B	SDP-X-360-A/B
Thermal conductivity	W/m・K	5.1	6.5	8.0	9.5	11.2	13.1
Before curing	Appearance	A:Grayish white B:Pink	A:Grayish white B:Pink	A:Grayish white B:Pink	A:Gray B:Pale white	A:Gray B:Pale pink	A:Gray B:Pale pink
	Mixed viscosity at 25℃ Pa・s	239	340	201	320	210	360
	Workable time at 25℃ h	6	6	6	6	4	4
	Specific gravity	A:3.25 / B:3.26	A / B:3.31	A / B:3.14	A / B:3.05	A / B:2.80	A / B:2.84
	Standard curing conditions	25℃×24h					
After curing	Hardness Shore OO	42	60	69	54	64	61
	Dielectric breakdown strength kV/mm	21	20	16	14	15	15
	Flame resistance UL94	V-0	V-0	V-0	V-0 equivalent	V-0 equivalent	V-0 equivalent

(Not specified values)

Gel Grease : One-component Non-curing Type

Parameter \ Product name	CLG-3500	CLG-4500	CLG-10000	CLG-12000	G-800	X-23-8197
Thermal conductivity W/m・K	3.5	4.5	10.4	12.1	4.0	6.0
Appearance	White	White	Grayish white	Grayish white	White	White
Specific gravity	3.1	3.2	3.4	3.3	4.2	3.3
Viscosity at 25℃ Pa・s	250	550	N/A	N/A	170	400
Dielectric breakdown strength kV/mm	8.9	4.7	6.8	6.8	3.2	8.8

(Not specified values)

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Heat Dissipation | Flame Retardancy | Electrial Insulation

Thermal Interface Silicone Potting Agents

Product Usage

Thermal Interface Materials

Contact → Sales and Marketing Department IV
Phone : +81-3-6812-2410

Features and Benefits

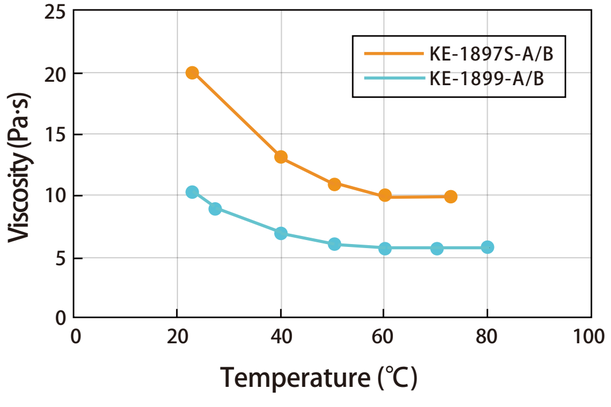
- It has excellent thermal conductivity.
- Flame retardant UL94 standard V-0 certified product (equivalent).
- It exhibits stable electrical characteristics despite environmental changes such as temperature and humidity.
- KE-8006-A/B is a two-component addition cure type that cures at room temperature. It contributes to energy savings and can be used in places where heat cannot be applied.
- The other three products cure at 120° C for 1 hour.
  The workable time after mixing A/B two liquids is long, making it easy to use.

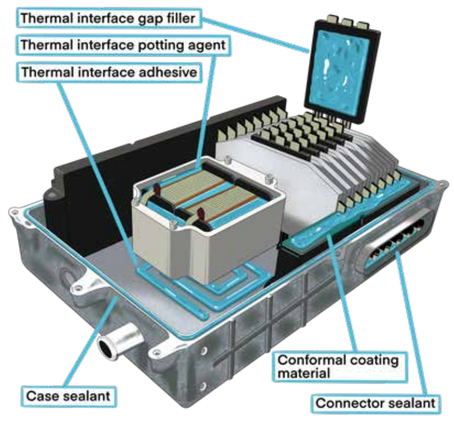
Applications

Heat dissipation, insulation and moisture-proof potting for terminal boxes

Mixed Viscosity Temperature Dependence

KE-1897S-A/B, KE-1899-A/B





Application Examples
PCU (Power Control Unit)

General Properties

Parameter		Product name KE-1897S-A/B	KE-8006-A/B	KE-1899-A/B	KE-8001-A/B
Thermal conductivity	W/m・K	2.1	2.2	3.0	3.2
LMW siloxane content ΣD_3-D_{10}	ppm	<300	<300	<300	<300
Flame resistance	UL94	V-0	V-0 equivalent	V-0	V-0 equivalent
Before curing: Appearance		A : Gray / B : White	A : Gray / B : White	A : Gray / B : White	A : Gray / B : White
Before curing: Viscosity at 23℃	Pa・s	A : 13 / B : 7	A : 12 / B : 7.5	A : 26 / B : 17	A : 33 / B : 20
Before curing: Workable time (reference) at 23℃	h	48	2	48	48
Before curing: Recommended curing conditions		120℃×1h	23℃×24h	120℃×1h	120℃×1h
After curing: Density	g/cm³	2.78	2.75	2.99	3.04
After curing: Hardness	Durometer A	15	23	16	53
After curing: Tensile strength	MPa	0.3	0.4	0.3	1.0
After curing: Elongation at break	%	80	39	60	30
After curing: Volume resistivity	TΩ・m	0.1	0.1	0.3	0.28
After curing: Dielectric breakdown strength	kV/mm	17	17	17	19
After curing: Tensile lap-shear strength (Al/Al)	MPa	0.2	0.3	0.2	0.5

(Not specified values)

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Easy Application | Waterproof | Long Lasting Weathre Resistance | Flame Resistance | Anti-rust

Waterproof Silicone Adhesive Sheet for Civil Engineering and Construction

Product Usage

Silicone Adhesive Sheet for Civil Engineering and Construction

Contact → Sales and Marketing Department III
Phone : +81-3-6812-2409

Catpad™ Series

Cat-Tape™ Clear

Silicone adhesive sheets for innovative applications to civil engineering and construction applications

■ Features and Benefits

- Excellent resistance to extreme changes in temperature, stable performance over a wide temperature range of -40℃ to 180℃.
- Silicone offers excellent durability and weather resistane.
- Excellent seal and waterproof performance over a long period of time.
- It sticks well to most materials such as metallics and concrete.
- It will not cause corrosion or deterioration of metallic, concrete, etc.
- Excellent flame resistance, no fire spread or carbonization even after more than 5 minutes exposure from a direct flame from a warning flare.
- Excellent workability, matches the shape of the waterproof surface, and can be easily cut on site for rapir.
- It is a product with high safety and low environmental impact.

■ Application Examples

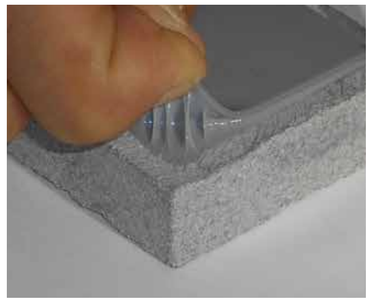
- Waterproof for bridges, tunnels, open channels, roofs, etc.

■ Produc Lineup

Item \ Product name	Catpad™	Catpad™Clear	Catpad-Cloth	Cat-Tape™Clear
Features	Patented (No. 5765268) in Japan	Allows for inspection of the repair and confirmation of appearance and aging	Enhanced with Glass Cloth	It is used to finish the edges and overlapping sections. Reliability of waterproofing will be improved.
Type	Sheet type / Roll type	Sheet type / Roll type	Sheet type / ※No roll type	Transparent type
Structure	Base layer (silicone rubber) t : 0.8 mm; Adhesive layer (silicone gel) t : 1.0 mm; Separator film	Base layer (silicone rubber) t : 0.8 mm; Adhesive layer (silicone gel) t : 1.0 mm; Separator film	Base layer (silicone rubber) t : 0.8 mm; Adhesive layer (silicone gel) t : 1.0 mm; Separator film	Separator film; Tape body : about 2mm thick silicone putty

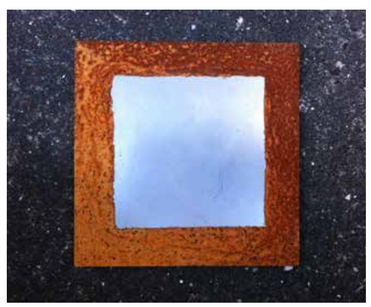
■ Features and Benefits

- Cat-Tape Clear cures and bonds in 24 hours after application, and bonds strongly to both Catpad sheets and mortar foundation surfaces.
- Caulking gun and masking tape are not required due to the ease of application.
- Can be used to bridge gaps and joints without causing discoloration or staining due to its putty-like consistency.
- Less waste, which is better for the environment.



Adheres to most materials

Maintains water repellency for a long time



No rust on the sheet attachment part

Excellent flame resistance

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Shin-Etsu Chemical Co.,Ltd.

Shin-Etsu Chemical Co., Ltd.
4-1, Marunouchi 1-chome, Chiyoda-ku, Tokyo, 100-0005 Japan

Silicone Division
Sales and Marketing Department I
Phone : +81-(0)3-6812-2406 Fax : +81-(0)3-6812-2414

Sales and Marketing Department II
Phone : +81-(0)3-6812-2407 Fax : +81-(0)3-6812-2414

Sales and Marketing Department III
Silicone Rubbers for Molding
Phone : +81-(0)3-6812-2408 Fax : +81-(0)3-6812-2415
Heat-Shrinkable Rubber Tubing / Silicone Adhesive Sheet
Phone : +81-(0)3-6812-2409 Fax : +81-(0)3-6812-2415

Sales and Marketing Department IV
Liquid Silicone Rubbers / Thermal Interface Materials
Phone : +81-(0)3-6812-2410 Fax : +81-(0)3-6812-2415
Sealants
Phone : +81-(0)3-6812-2411 Fax : +81-(0)3-6812-2415

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 do Brasil Representação de Produtos Químicos Ltda.
Rua Coronel Oscar Porto, 736 - 8° Andar - Sala 84,
Paraíso São Paulo, SP Brasil CEP: 04003-003
Phone : +55-11-3939-0690 Fax : +55-11-3052-3904

Shin-Etsu Silicones Europe B.V.
Bolderweg 32, 1332 AV, Almere, The Netherlands
Phone : +31-(0)36-5493170 Fax : +31-(0)36-5326459
(Products & Services: Products for Cosmetics Application)

Germany Branch
Kasteler Str. 45, 65203 Wiesbaden, Germany
Phone : +49-(0)611-71187290
(Products & Services: Products for Industrial Applications)

Shin-Etsu Silicone International Trading (Shanghai) Co., Ltd.
29F Junyao International Plaza, No.789,
Zhao Jia Bang Road, Shanghai 200032, China
Phone : +86-(0)21-6443-5550 Fax : +86-(0)21-6443-5868

Guangzhou Branch
Room 2409-2410, Tower B, China Shine Plaza, 9 Linhexi Road,
Tianhe, Guangzhou, Guangdong 510610, China
Phone : +86-(0)20-3831-0212 Fax : +86-(0)20-3831-0207

Shin-Etsu Silicone Korea Co., Ltd.
GT Tower 15F, 411, Seocho-daero, Seocho-gu,
Seoul 06615, Korea
Phone : +82-(0)2-590-2500 Fax : +82-(0)2-590-2501

Shin-Etsu Silicone Taiwan Co., Ltd.
Hung Kuo Bldg. 11F-D, No. 167, Dunhua N. Rd.,
Taipei, 105406 Taiwan, R.O.C.
Phone : +886-(0)2-2715-0055 Fax : +886-(0)2-2715-0066

Shin-Etsu Singapore Pte. Ltd.
1 Kim Seng Promenade #15-05/06 Great World City
East Tower, Singapore 237994
Phone : +65-6743-7277 Fax : +65-6743-7477

Shin-Etsu Silicones Vietnam Co., Ltd.
Unit 4, 11th Floor, A&B Tower, 76A Le Lai Street,
Ben Thanh Ward, District 1, Ho Chi Minh City, Vietnam
Phone : +84-(0)28-35355270

Hanoi Branch
Unit 32, 29th Floor, LOTTE Center Hanoi East Tower,
54 Lieu Giai Street, Ba Dinh District, Hanoi City, Vietnam
Phone : +84-(0)24-32673868

Shin-Etsu Silicones India Pvt. Ltd.
Unit No. 403A, Fourth Floor, Eros Corporate Tower,
Nehru Place, New Delhi 110019, India
Phone : +91-11-43623081 Fax : +91-11-43623084

Shin-Etsu Silicones (Thailand) Ltd.
7th Floor, Unit 7F, Harindhorn Tower, 54 North Sathorn Road,
Silom, Bangrak, Bangkok 10500, Thailand
Phone : +66-(0)2-632-2941 Fax : +66-(0)2-632-2945

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