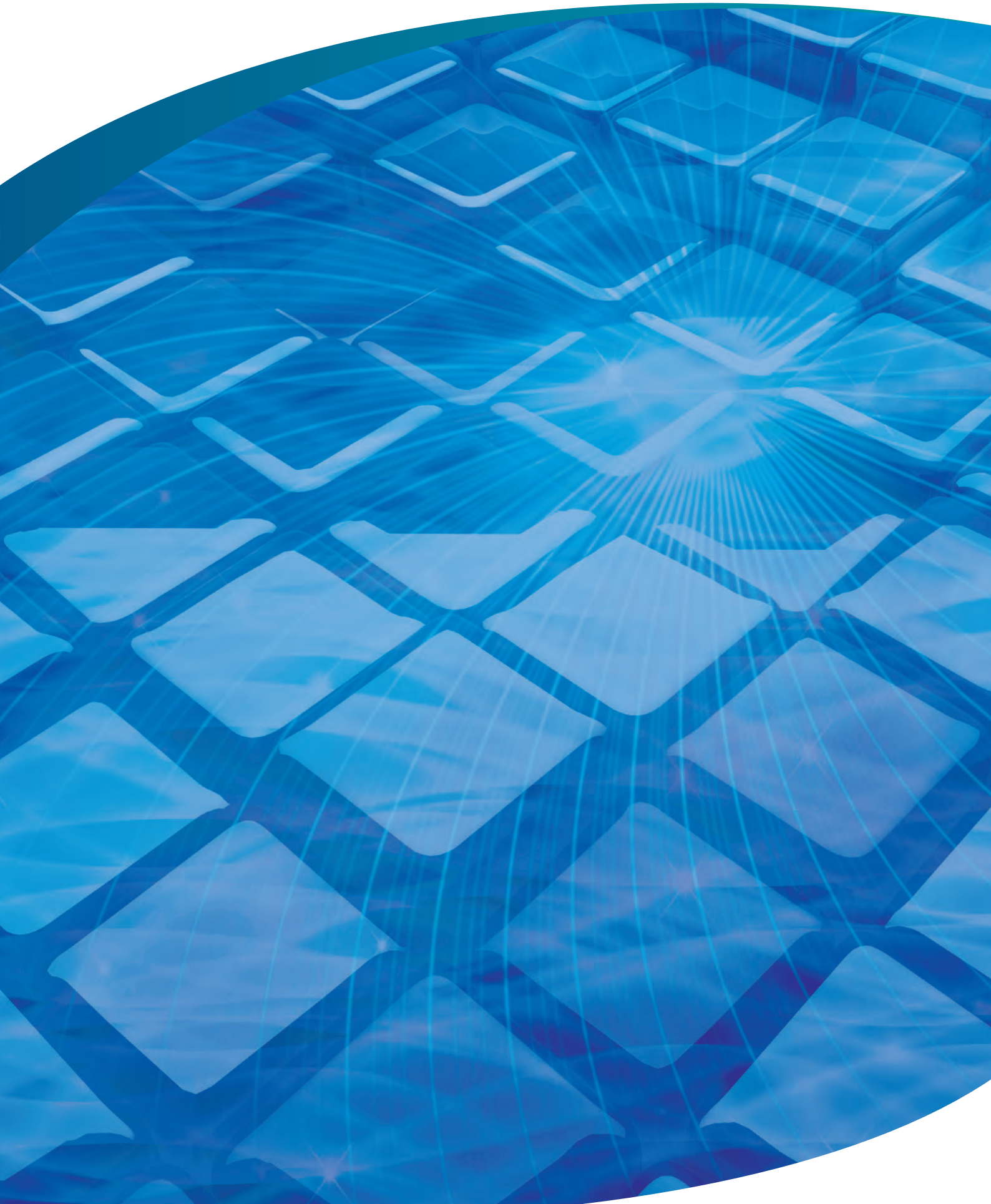
Shin-Etsu Silicone Products Guide

6th PLASTIC JAPAN

- Highly-functional Plastic Expo -

Shin-Etsu Silicone



Silicones for Acrylic Resin Modification

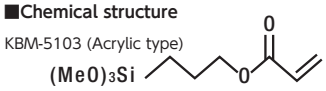
Shin-Etsu can provide a number of products suitable for modification of various types of acrylic resins, including water-based, solvent-based and UV-cure products. These function in various ways and can be used to improve durability (by improving adhesion to substrates, light resistance and heat resistance), for surface modification (e.g. by imparting water repellency and increasing hardness), or for reducing viscosity or increasing fill factor (by improving dispersion of fillers).

Inorganic – Organic Coupling Agent (Alkoxy groups + Acrylic groups)

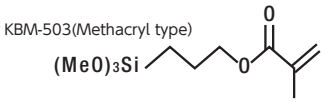
KBM-5103, KBM-503 Monomer Type

■Chemical structure

KBM-5103 (Acrylic type)



KBM-503(Methacryl type)



■Features & Benefits

Features	Benefits
High radical reactivity (especially the acrylics)	Higher strength and durability through improved adhesion

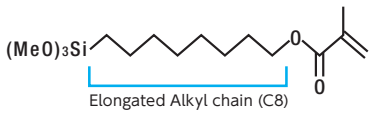
■Comparison with other radically reactive silane coupling agents

R (Functional groups)	Minimum curing dose (Mrad)
Vinyl	>10
Methacryloxy	5
Acrylic	2

*Silicones having acryloxy groups require smaller doses to cure completely than those with vinyl or methacryloxy groups, which is an indication of their exceptionally high radical reactivity.

KBM-5803 Long-chain Spacer Type

■Chemical structure



■Features & Benefits

Features (Function of longer alkyl chain length (C8))	Benefits
Improved hydrophobicity	Improved dispersion of inorganic fillers (enables lower viscosity, higher fill factors)
	Imparting water and alkali resistance
Improved flexibility	Imparting flexibility

■Comparison of inorganic filler dispersion (compared with C3 type)

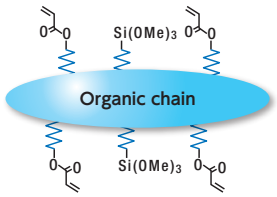
Product name	KBM-5803*	KBM-503 (C3 type)
Appearance		

*Left: KBM-5803 by improving dispersibility, transparency was improved

Formulation
Silane treated silica 10wt%
Multifunctional acrylic compounds 90wt%

X-12-1048, X-12-1050 Polymer type

■Chemical structure

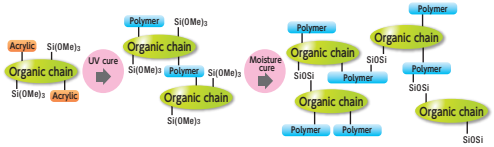


*Functional group equivalent (with Si(OR)³)
X-12-1048 = 1 X-12-1050 = 5

■Features & Benefits

Features	Benefits
High number of functional groups, good reactivity	Improved durability
High number of functional groups	Improved surface hardness
Low volatility	Active ingredient functions even at high temp..
Film forming property	Also works well as a primer
Main chain of organic groups	Excellent compatibility

■Reaction mechanism of dual cure (UV cure / moisture cure) material

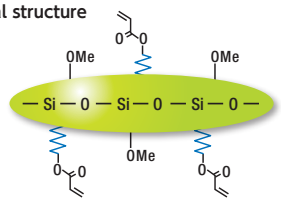


Parameter \ Product name	X-12-1050
Pencil hardness	>3H
Taber abrasion test (⊿Haze, 500g load 100 rotaions)	2.7

Silane:Curing agent:Polymerization catalyst=100:5:5
Curing agent = titanium butoxide
Cured film thickness = 5μm
Substrate = PET Cosmo Shine A4300 (0.2mm thickness)
(Not specified values)

KR-513 Siloxane type

■Chemical structure



■Features & Benefits

Features	Benefits
High number of functional groups, good reactivity	Higher strength and durability through improved adhesion
Low volatility	Good reaction stability
Main chain of siloxane skeleton	Durable against heat & light

■Comparison data of volatility with monomer type

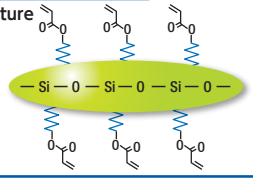
Product name	Volatile content %		
	105℃×3h	150℃×3h	180℃×3h
KR-513	3	6	7
KBM-5103	71	100	100

(Not specified values)

Related materials (siloxane+acrylic groups)

X-12-2475 Siloxane Type

■Chemical structure



■Features & Benefits

Features	Benefits
High number of functional groups	High hardness
Main chain of siloxane skeleton	Durable against heat & light

■Test result of higher hardness

Product name	Pencil hardness	Taber abrasion test (⊿Haze, 500g load 100 rotaions)
X-12-2475	3H	2.5
X-12-2430C	2H	3.0
Blank	H	4.5

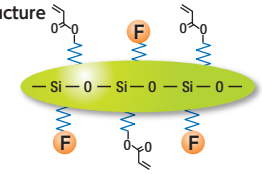
(Not specified values)

Acrylic Coating Material Blend Ratio
Dipentaerythritol triacrylate : 80 wt. part
Hexanediol diacrylate : 20 wt. part
2-Hydroxy-2-methyl-1 phenyl-plopane-1-one : 10 wt. part
The above acrylic coating / Si material = 100 / 50 wt. part

Application / Cure Method
Film thickness : about 20μm
Substrate : POLYCASE made by Sumitomo Bakelite Co., Ltd.
ECK100 clear 2mm thickness
UV curing condition : High-pressure mercury vaper lump 600mJ/cm² Nitrogen atmosphere

X-12-2430C Fluorine Contained Type

■Chemical structure



F =Fluorine

■Features & Benefits

Features	Benefits
Main chain of siloxane skeleton	Durable against heat & light
High number of functional groups	High hardness
Fluorine content	Imparting anti-stain properties
	Imparting water and oil repellency

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Silicones for Epoxy Resin Modification

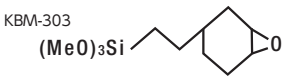
Shin-Etsu manufactures a range of products suitable for modification of epoxy resins used for coating, molding and other applications. These function in various ways and can be used to improve adhesion to substrates, improve durability (through improved light and heat resistance), and improve mechanical properties (e.g. by reducing cure shrinkage and relieving stress), and for reducing viscosity or increasing fill factor (by improving dispersion of fillers).

Inorganic – Organic Coupling Agent (Alkoxy groups + Epoxy groups)

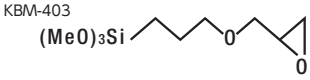
KBM-303, KBM-403 Monomer Type

■Chemical structure

KBM-303



KBM-403



■Features & Benefits

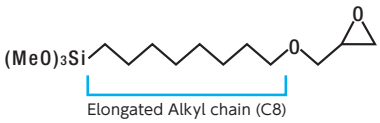
Features	Benefits
Containing epoxy groups	Higher strength and durability through improved adhesion

■Compatible resins with epoxy silane

Resin / Functional groups	Thermoplastic resins										Thermosetting resins									Elastomer / Rubber					
	Polyethylene	Polypropylene	Polystyrene	Acrylic	PVC	Polycarbonate	Nylon	Urethane	PBT, PET	ABS	Melamine	Phenolic	Epoxy	Urethane	Polyimide	Diallylphthalate	Unsaturated polyester	Furan	Polybutadiene rubber	Nitrile rubber	Epichlorohydrin rubber	Neoprene rubber	Butyl rubber	Polysulfide	Urethane rubber
Epoxy	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+			+	+	+

KBM-4803 Long-chain Spacer Type

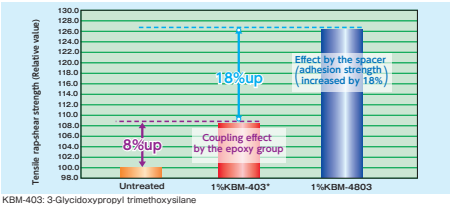
■Chemical structure



■Features & Benefits

Features (Function of longer alkyl chain length (C8))	Benefits
Improved hydrophobicity	Improved dispersion of inorganic fillers (enables lower viscosity, higher fill factors)
	Imparting water and alkali resistance
Improved flexibility	Imparting flexibility

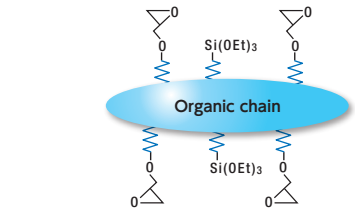
■Epoxy / glass coupling performance evaluation



KBM-403: 3-Glycidoxypropyl trimethoxysilane

X-12-981S, X-12-984S Polymer type

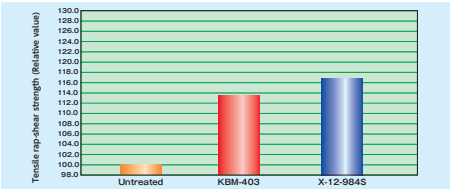
■Chemical structure



■Features & Benefits

Features	Benefits
High number of functional groups, good reactivity	Improved durability
High number of functional groups	Improved surface hardness
Low volatility	Active ingredient functions even at high temp..
Film forming properties	Also works well as a primer
Main chain of organic groups	Excellent compatibility

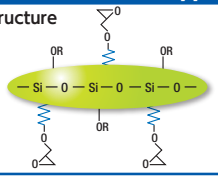
■Epoxy / glass coupling performance evaluation



Test method: (1) 1% aqueous solution applied to glass substrate
(2) Cured material (Epoxy resin / triethylenetetramine) was prepared and its adhesive strength tested.
*Adhesive strength calculated using that of untreated material (100) as the standard.
KBM-403: 3-Glycidoxypropyl trimethoxysilane

KR-516, KR-517 Siloxane type

■Chemical structure



R=Me,Et

■Features & Benefits

Features	Benefits
High number of functional groups, good reactivity	Higher strength and durability through improved adhesion
Low volatility	Good reaction stability
Main chain of siloxane skeleton	Durable against heat & light

■Comparison data of volatility with monomer type

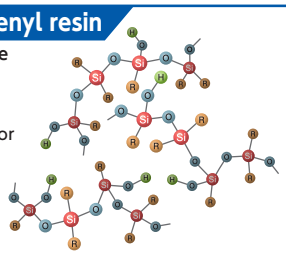
Product name	Volatile content %		
	105℃×3h	150℃×3h	180℃×3h
KR-516	7	15	20
KBM-403	34	96	-

(Not specified values)

KR-480 High phenyl resin

■Chemical structure

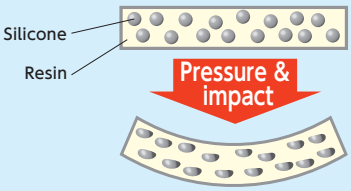
Ⓡ =Methyl groups or phenyl groups



■Features & Benefits

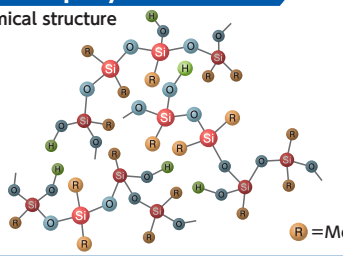
Features	Benefits
High phenyl content	Excellent compatibility
Siloxane skeleton	Durable against heat & light
	Imparting flame retardancy
High molecular resin structure	Imparting stress relaxation

■Model of improved impact resistance



KR-480 + epoxy modification

■Chemical structure



Ⓡ =Methyl groups, phenyl groups or epoxy groups

■Features & Benefits

Features	Benefits
High epoxy content	Siloxane skeleton is incorporated into the epoxy as it reacts with KR-480.

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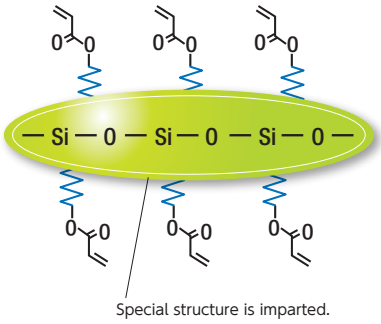
Silicones for Resin Modification

NEW

Silicones for improving crack & abrasion resistance of UV-cure acrylic resins (Under development)

■Chemical structure

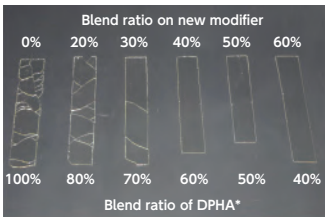


■Features and benefits

Features	Benefits
Special structure	Excellent bend resistance without sacrificing hardness
Siloxane structure	Excellent heat and light resistance Excellent transparency
Acrylic x Siloxane structure	Excellent compatibility with organic resin and silicone resin

●Cured sheet with excellent flex resistance

■Comparison of physical properties mixed with DPHA (0.6mm film)

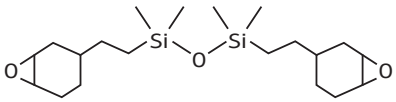


*DPHA=Di-Pentaerythritol Hexa Acrylate

Silicones Containing Alicyclic Epoxy Groups

X-40-2669

■Chemical structure



■Features and benefits

Features	Benefits
Alicyclic epoxy groups	High reactivity, high Tg
Siloxane structure	Heat and light resistance
Straight chain siloxane structure	With low surface tension, excellent leveling property and wettability
Low viscosity	Can be used as a reactive diluent.
Oligomer structure	Low out gas

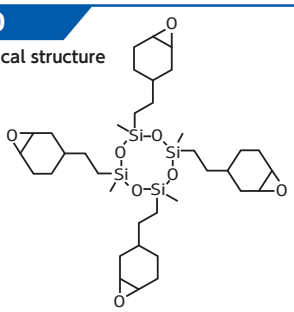
■Viscosity when used to dilute hydrogenated epoxy (Santoto ST-3000*)

Mix ratio wt%	100	50	20	Surface tension mN/m
X-40-2669	45	230	980	33
Alicyclic epoxy	260	650	1,500	47

*Made by Toto Kasei Co., Ltd. (Not specified values)

KR-470

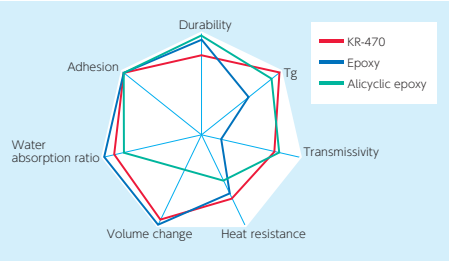
■Chemical structure



■Features and benefits

Features	Benefits
Alicyclic epoxy groups	High reactivity, high Tg
Siloxane skeleton	Heat and light resistance
Cyclic siloxane structure	Low cure shrinkage
Single structure	Excellent compatibility, reactions are easy to control.

■Comparison chart with epoxy resin

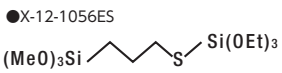


For improving adhesiveness & shelf life of urethane adhesives

X-12-1056ES, X-12-1172ES

■Chemical structure

●X-12-1056ES



●X-12-1172ES

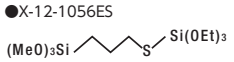
■Features and benefits

Features	Benefits
Functional groups are protected.	Improves stability of compositions (Epoxy, acrylic and isocyanate)
Hydrolizable silyl groups	Improved adhesion
Mercapto groups are protected (X-12-1056ES)	Reduced odor

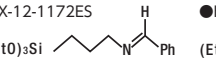
■Lap-shear strength test result

【Chemical structure】

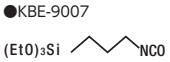
●X-12-1056ES



●X-12-1172ES



●KBE-9007



【Compounds】

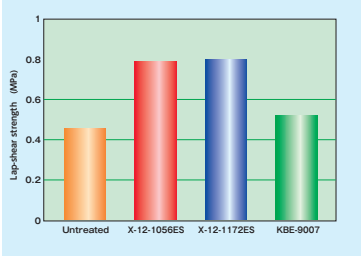
Urethane polymer containing NCO·····100part
Plasticizer·····40part
Fillers·····100part
Catalysts·····0.1part
Silane coupling agents····1.0part

【Curing conditions】

23℃/50%RH × 3days

【Substrate】

Glass



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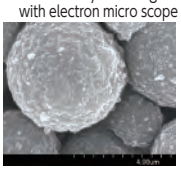
Silicone Powders

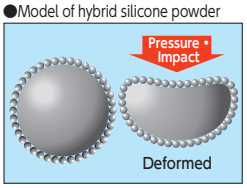
Shin-Etsu has developed a unique line of silicone powders which fall into three categories:Hybrid Silicone Powder, Silicone Resin Powder and Silicone Rubber Powder.

Hybrid Silicone Powder
Form : Rubber powders covered with resin

●KMP-600 by scanning with electron micro scope



●Model of hybrid silicone powder

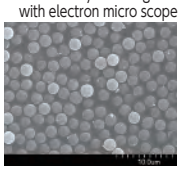


■Features

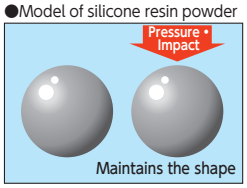
Heat resistance	+
Weatherability	++
Dispersibility into resins	++
with organic solvents	Rubber part swells

Silicone Resin Powder
Molecular structure : 3D network structure

●KMP-706 by scanning with electron micro scope



●Model of silicone resin powder

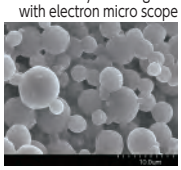


■Features

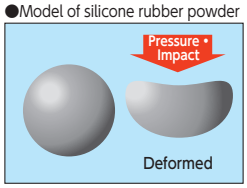
Heat resistance	++
Weatherability	++
Dispersibility into resins	++
with organic solvents	No swelling

Silicone Rubber Powder*
Molecular structure: Straight-chain crosslinked polymer

●KMP-597 by scanning with electron micro scope



●Model of silicone rubber powder



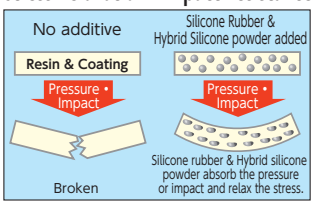
■Features

Heat resistance	+
Weatherability	++
Dispersibility into resins	±
with organic solvents	Swelling

*There are also aqueous dispersion of silicone rubber power.

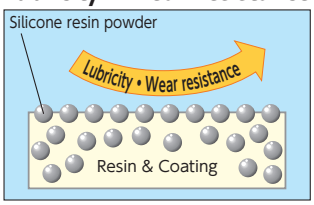
Enhanced Properties

Stress Relaxation • Impact Resistance



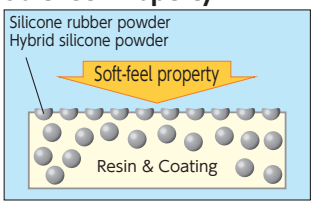
Hybrid powder	++
Resin powder	–
Rubber powder	++

Lubricity • Wear Resistance



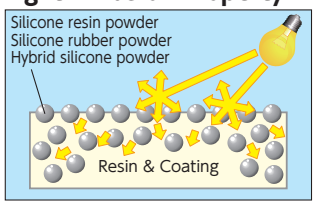
Hybrid powder	++
Resin powder	++
Rubber powder	+

Soft-feel Property



Hybrid powder	++
Resin powder	–
Rubber powder	++

Light Diffusion Property



Hybrid powder	++
Resin powder	++
Rubber powder	++

* ++ : Excellent + : Good ± : Satisfactory – : Poor

General Properties

Type \ Parameter	Product name	Shape	Average particle size μm	Particle size distribution μm	True specific gravity	Moisture content %	Rubber hardness Durometer A	Refractive index	
								Rubber part	Resin part
Hybrid silicone powder	KMP-600	Spherical powder	5	1~15	0.99	0.1	30	1.41	1.43
	KMP-601	Spherical powder	12	2~25	0.98	0.1	30	1.41	1.43
	KMP-602	Spherical powder	30	4~60	0.98	0.1	30	1.41	1.43
	KMP-605	Spherical powder	2	0.7~5	0.99	0.1	75	1.42	1.43
	X-52-7030	Spherical powder	0.8	0.2~2	1.01	0.1	75	1.42	1.43
Silicone resin powder	KMP-706	Spherical powder	2	1~4	1.3	1	-	-	1.43
	KMP-701	Spherical powder	3.5	1~6	1.3	1	-	-	1.43
	X-52-1621	Spherical powder	5	1~8	1.3	1	-	-	1.43
	X-52-854	Spherical powder	0.7	0.2~5	1.3	1	-	-	1.43
Silicone rubber powder	KMP-597	Spherical powder	5	1~10	0.97	0.1	30	1.41	-
	KMP-598	Spherical powder	13	2~30	0.97	0.1	30	1.41	-
	X-52-875	Association powder	30	1~100	0.97	0.1	35	1.41	-
	KM-9729*	Emulsion	2	-	-	-	-	-	-
	X-52-1133*	Emulsion	5	-	-	-	-	-	-

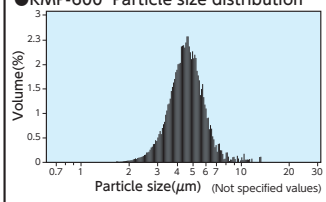
*Aqueous dispersion of silicone rubber power. By drying spherical powders are obtained.

(Not specified values)

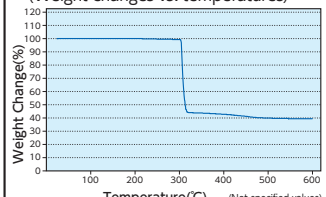
Product Data

Hybrid silicone powder

●KMP-600 Particle size distribution



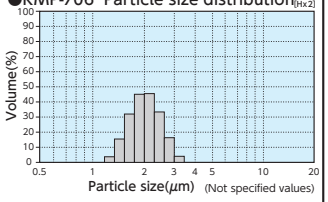
●KMP-600 Heat resistance
(Weight changes vs. temperatures)



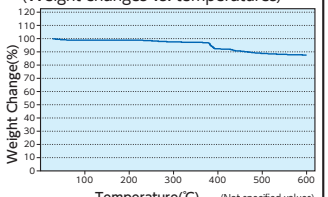
Rate of temperature increase: 10℃/min Atmosphere : Air

Silicone resin powder

●KMP-706 Particle size distribution(Hx2)



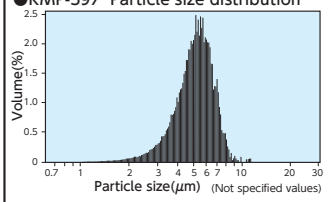
●KMP-706 Heat resistance
(Weight changes vs. temperatures)



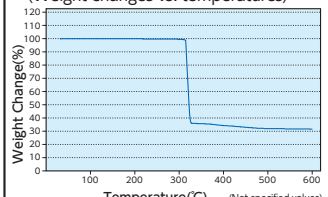
Rate of temperature increase: 10℃/min Atmosphere : Air

Silicone rubber powder

●KMP-597 Particle size distribution



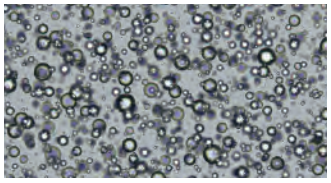
●KMP-597 Heat resistance
(Weight changes vs. temperatures)



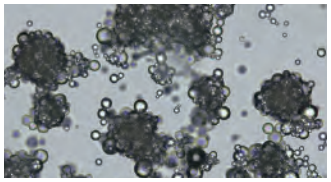
Rate of temperature increase: 10℃/min Atmosphere : Air

Dispersibility

Dispersibility in liquid epoxy resin



●Hybrid silicone powder KMP-601



●Silicone rubber powder *

*Applying a shearing force improves dispersibility of silicone rubber powders in resin.

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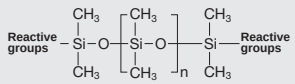
Modified Silicone Fluids

Modified Silicone Fluids which bind various reactive groups exhibit a variety of properties by reacting with organic resin.

Enhanced properties

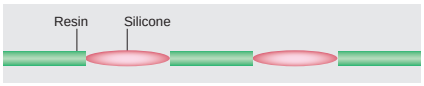
Heat resistant
Cold resistant
Weather resistant
Impact resistant
Flexibility

Dual-end reactive silicone fluids



Compounds

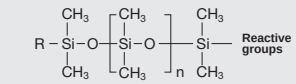
Block copolymer



Enhanced properties

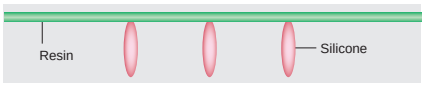
Lubricating property
Release property
Wear resistant
Water repellent

Single-end reactive silicone fluids



Compounds

Graft copolymer



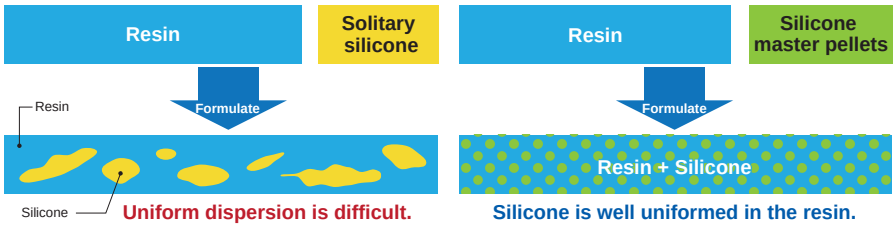
Reactive groups \ Types of resins		Thermoset resin		Thermoplastic resin				
		Polyurethane	Epoxy	Acrylic	Polyimide	Polyamide	Polycarbonate	Polyester
Amino groups			●		●	●		
Epoxy groups			●					●
Hydroxyl groups	Carbinol type	●						●
	Diol type	●						●
	Polyether type	●						●
	Phenol type		●				●	●
Methacryl groups				●				
Carboxyl groups			●			●		●
Mercapto groups				●				
Acidanhydride groups			●		●	●		●

Silicone Master Pellets

By blending few amounts of Silicone Master Pellets with resin, it is easy to obtain a compound in which the silicone is evenly dispersed.

Enhanced properties

Lubricating property, Release property
Anti-blocking property, Impact resistant
Stress relaxation, Coloring property



Product name \ Parameter	Resin	Silicone content %	MFRg / 10mins	MFR Test condition
X-22-2101	Homo Polypropylene	50	33	210°C / 2.16kg
X-22-2125H	Low density polyethylene	50	20	190°C / 2.16kg
X-22-2138B	Ethylene vinylacetate copolymer	40	5	190°C / 2.16kg
X-22-2102	Polyacetal	40	55	190°C / 2.16kg
X-22-2184-30	ABS	30	45	220°C / 2.16kg

(Not specified values)

Silicone Master Pellets

We can discuss the Silicone formulation with your preferred resin. Please do not hesitate to contact us.

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Silicone Rubber for LIMS with Transparency

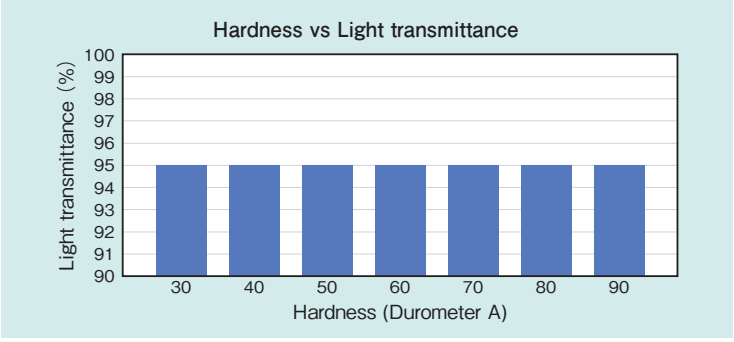
KE-2061 Series

KE-2061 Series can be applied to a wide range of molding products as it improved the transparency and yellowing of conventional transparent LIMS grade, and has a lineup from low to high hardness.

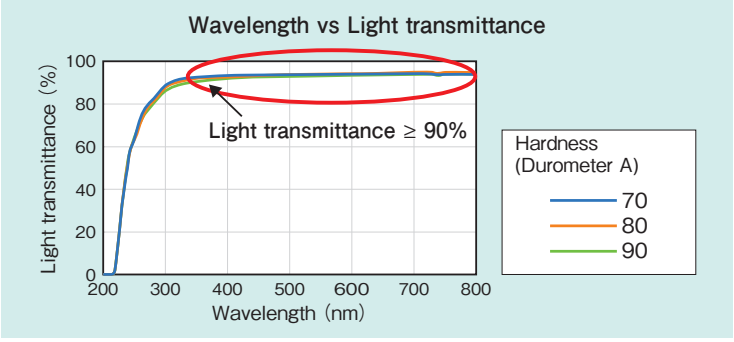
Magnifier molded with KE-2061

Features

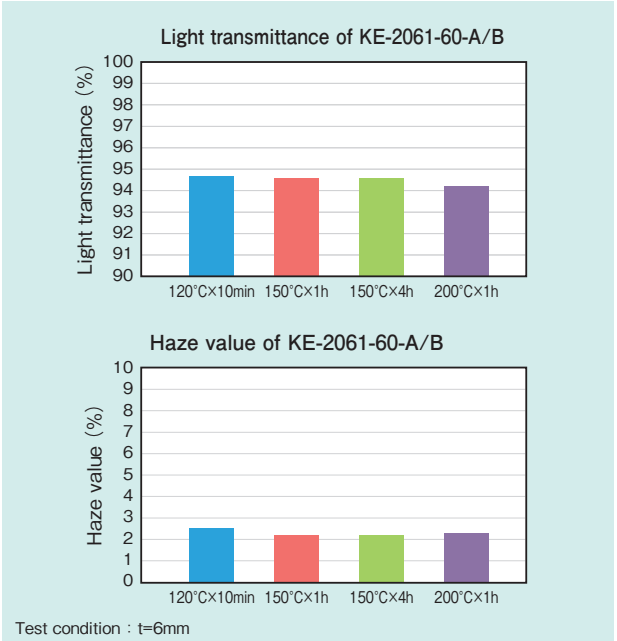
Hardness A wide range of hardness (Durometer A) between 30 and 90.



Optical properties Change in hardness doesn't affect light transmittance and refraction.



Heat resistance Small changes in transparency due to heat.



Test condition : t=6mm

Applications

●LED lenses, Lighting equipment, Optical components as Light guide plates, etc.

General properties

Parameter \ Product name	KE-2061-30-A/B	KE-2061-40-A/B	KE-2061-50-A/B	KE-2061-60-A/B	KE-2061-70-A/B	KE-2061-80-A/B	KE-2061-90-A/B
Hardness Durometer A	30	39	50	59	70	79	86
Light transmittance %	95	95	95	95	95	95	95
Haze value %	2	2	2	2	2	2	2
Density 23℃ g/cm³	1.02	1.03	1.03	1.04	1.05	1.07	1.08
Tensile strength MPa	3.5	5.2	6.3	7.3	11.0	11.4	6.0
Elongation at break %	350	300	230	180	98	78	40
Tear strength kN/m	3	6	6	9	10	6	3

(Not specified values)

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Vibration Control Silicone Rubber

KE-501EM-U Series / KE-5550-U Series

The silicone rubbers in the KE-501EM-U and KE-5550-U Series provide vibration dampening for automotive applications and perform well over a wide range of temperatures.

Features

●Excellent heat resistance, cold resistance and weather resistance.
●Consistent vibration dampening properties at both high and low temperatures.

Applications

●Muffler hangers, Engine mounts, Suspension bushes

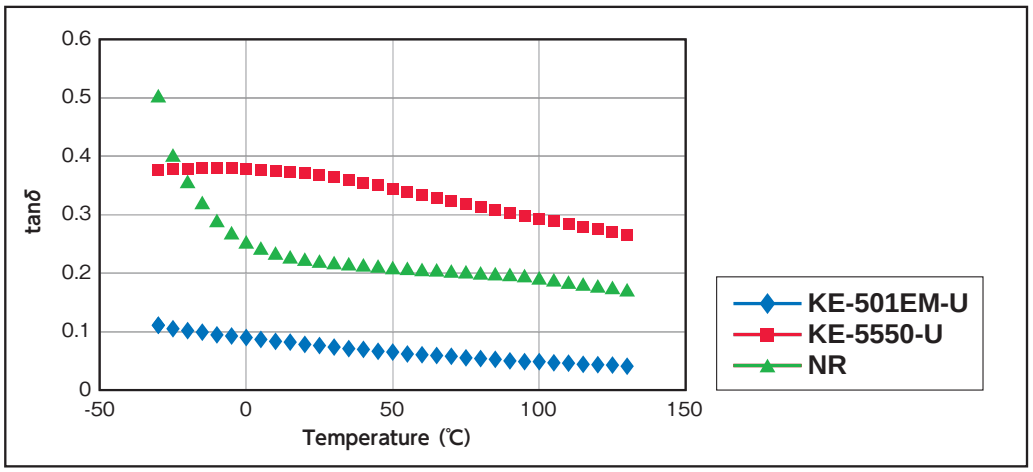
General properties

Parameter \ Product name		KE-501EM-U	KE-5550-U	KE-551-U
Type		Low dynamic magnification	High decrement	For general purpose
Density	g/cm³	1.10	1.25	1.14
Hardness Durometer A		53	50	56
Tensile strength	MPa	8.3	9.0	11.2
Elongation at break	%	550	710	530
Tear strength Crescent	kN/m	28	35	17
Rebound resilience	%	74	21	65
Viscoelasticity (Temperature : Room temperature / Frequency : 30Hz / Displacement : 400μm)				
Elastic modulas E'	MPa	4.22	5.67	5.10
tan δ		0.07	0.39	0.11
Dynamic magnification				
E' at 0.1Hz, 400μm	MPa	3.66	4.07	4.48
E' at 100Hz, 50μm	MPa	4.56	11.41	6.36
Dynamic magnification : E'100/E'0.1		1.25	2.80	1.42
Curing agent		C-15/1.5 phr	C-8/2.0 phr	C-15/1.5 phr

Curing condition : Press cure165℃ × 10min + Post cure200℃ × 4h

(Not specified values)

Viscoelasticity



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UV Cure Polyimide Silicone Adhesives

Features

●**Rapid cure:** UV-cure system means the potential for shorter tack time and a heating-free workflow
●**Good adhesion:** Adheres strongly to many substrate materials
●**Low water vapor permeability**
●**Low low-molecular-weight siloxane**

Applications

●**For protecting electrodes against corrosion, dielectric coatings, lens fastening, display fastening**

General properties

Parameter \ Product name			SMP-7004-3S	SMP-7014-3S	SMP-7015-3S
Category			Coating	Adhesion	Adhesion
Reaction type			Radical	Radical	Radical
Appearance			Yellow transparent	Yellow slightly cloudy	Yellow slightly cloudy
Viscosity (Stirred viscosity)		mPa.s	2,000 (-)	10,000 (8,000)	300,000 (60,000)
Recommended curing conditions	UV light source		Metal halide lamp		
	Estimated light intensity	mJ/cm²	1,980	1,980	1,980
Modulus of elasticity		MPa	190	200	800
Tensile strength		MPa	18.2	20.2	18.0
Elongation at break		%	120	90	50
Water vapor permeability 40℃×24h (t=0.8mm)		g/m²	9.90	4.00	6.10
Applicability	LED-UV (365nm)		○	○	○
	Atmospheric air cure		○	○	○

(Not specified valued)

Die shear strength test

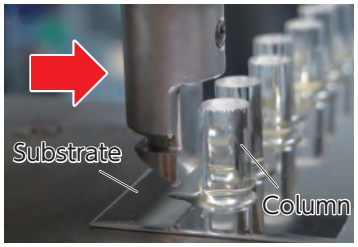
Parameter \ Product name			SMP-7004-3S	SMP-7014-3S	SMP-7015-3S
Die shear	Glass substrate / Glass column	MPa	18.6	19.1	10.7
	PET substrate / Glass column	MPa	-	-	8.0
Curing conditions*	UV light source		Metal halide lamp (33mW)		
	Estimated light intensity	mJ/cm²	2,000		

*Opened to the atmosphere under room temperature

(Not specified valued)

Test piece preparation method

1) 15 mg of each product was applied to the substrate.
2) Cylinders were pressed down using finger.
3) Product was UV-cured with a metal halide lamp while left exposed to air.
4) Die shear strength was measured.



●Test method

Reliability test data SMP-7014-3S

Parameter \ Product name			Initial	Leaving under high temperature	Temperature and Humidity Controlled Test	Heat cycle test
				150℃×500 h	60℃/90%RH×500h	-30⇔70℃(30 min each) 200cycle
Die shear	Glass substrate / Aluminum column	MPa	9.1	20.3*	10.3	14.4
	Aluminum substrate / Glass column	MPa	9.1	20.0	17.3	13.2
	SUS304 substrate / Glass column	MPa	7.6	20.3*	18.1	11.9

*Limit of measurement

(Not specified valued)

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UV Cure Silicone Rubbers for Optical Bonding

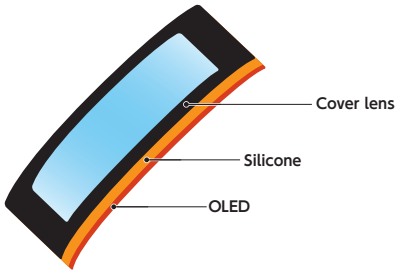
KER-4530 / KER-4530-F / KER-4531 / KER-4532

Features

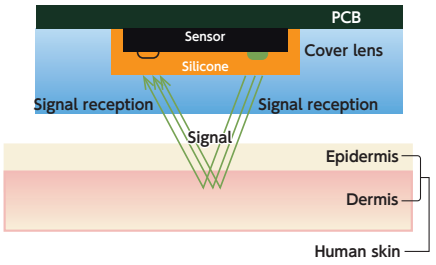
- One-part
- Delay curing type (Can be worked after UV irradiation)
- Metal halide/LED light source available
- Step curing function : 3,000mJ/cm$_2$ +23℃×2h
- Lower MURA risk - Excellent elongation : 450% - 600%

Application examples

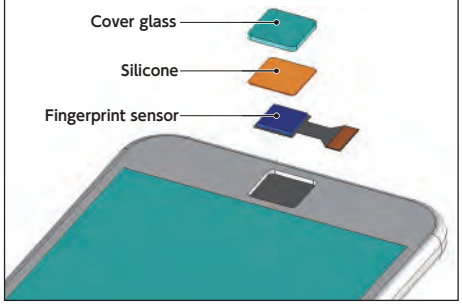
■Curve display lamination



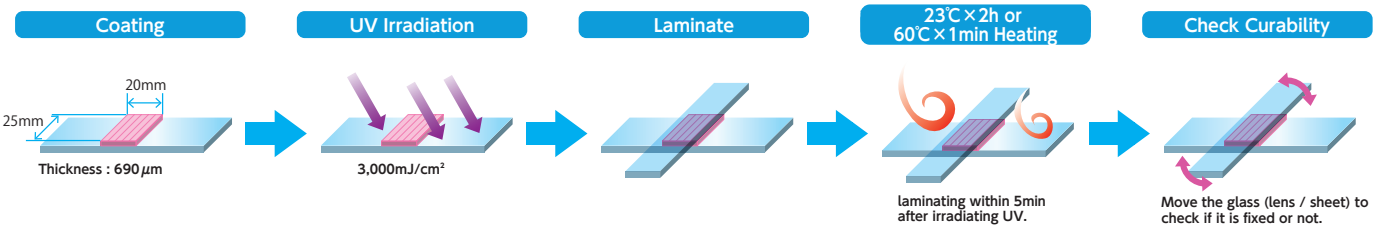
■Heart rate bonding



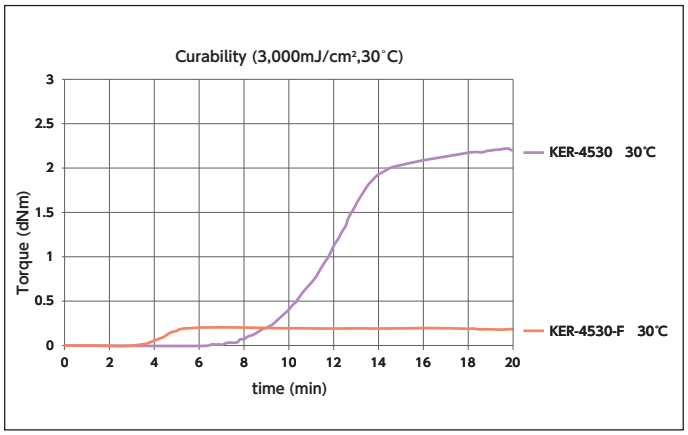
■Cover lens

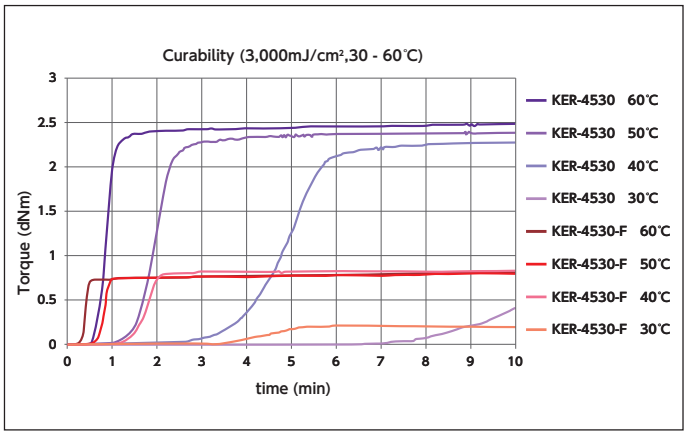


Test method of the curing speed curve



Curability





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UV Cure Silicone Products

UV Addition Cure Type Liquid Silicone Rubber KER-4690-A/B

KER-4690-A/B is a UV addition cure type liquid silicone rubber.

Features

- The material loses its stickiness and becomes non-flowable after a few minutes of UV exposure.
- Visible light to wavelength 250nm is transmissive before and after cured.
- In the curing process this material is curable under room temperature.
  User does not need to be concerned about volume expansion.

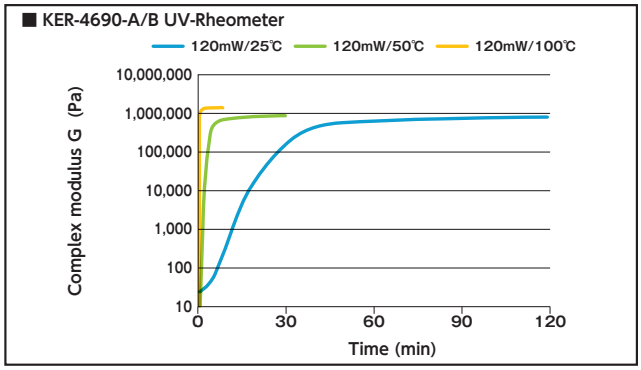
General Properties

Parameter / Grade		KER-4690-A	KER-4690-B
Appearance		Colorless transparent	
Viscosity after mixed	mPa·s	3,000	
Density	g/cm³	1.03	
Hardness Durometer A	23℃	56	
Elongation at break	%	110	
Tensile strength	MPa	7.9	
Tear strength, crescent piece	kN/m	3	
Cure shrinkage	%	0.1	

※ Cure condition : UV2,000mJ/cm2 (365nm) + 23℃ × 24h
A:B mix ratio=1:1

(Not specified values)

Reducing curing time by heating



UV Radical Cure Type Liquid Silicone Rubber KED Series

KED Series is a UV radical cure type liquid silicone rubber.

Features

- Rapid cure by UV irradiation
- Molding can be made owing to non-adhesive type.
- Product line-up with different hardness is prepared.
- Physical properties can be adjusted
  by mixing KED-1P and KED-2P.

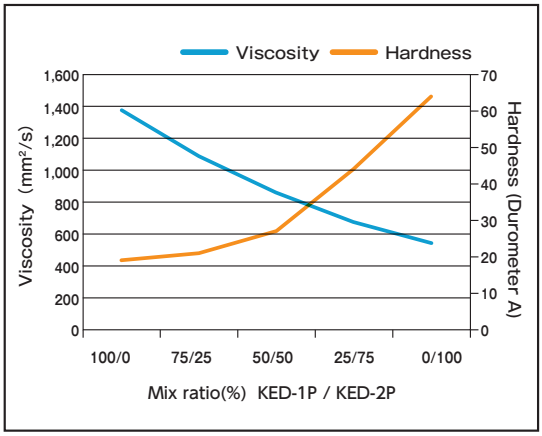
General Properties

項目 / 製品名			KED-1P	KED-2P
One point			High viscosity, low hardness	Low viscosity, high hardness
Before curing	Viscosity	mm²/s	1,380	540
	Refractive index		1.457	1.462
After curing	Hardness Durometer A		19	64
	Tensile strength	MPa	1.2	6.5
	Elongation at break	%	230	310
	Specific gravity at 25℃		1.044	1.056

Curing conditions
1. Pouring the sample into the case to make its thickness 2,0mm.
2. Irradiating UV light under N_2 atmosphere from the both of the top of the sample and back.
3. The amount of irradiating UV is 2,000mJ/cm² for each side.

(Not specified values)

Properties depending on blend ratio



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Shin-Etsu Chemical Co.,Ltd.

Silicone Division

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

<Modified Silicone Fluids> <Silicone Master Pellets> <Silicone Powders>

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

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This is an edited version of the product data released on Apr. 2017.
This catalog was published for 6th PLASTIC JAPAN
-Highly-functional Plastic Expo-