

Shin-Etsu Silicone Products Guide

- Emulsifier-free

Aqueous Silicone Resin

- Balancing environmental consideration and high performance

Shin-Etsu Silicone × **PFAS-free**

Silicones Making Resins Highly Functional

INDEX

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.

This brochure also includes silicone defoaming agents.

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.
Defoaming Agents	Eliminate foam and suppress foam generation.

4 Usages

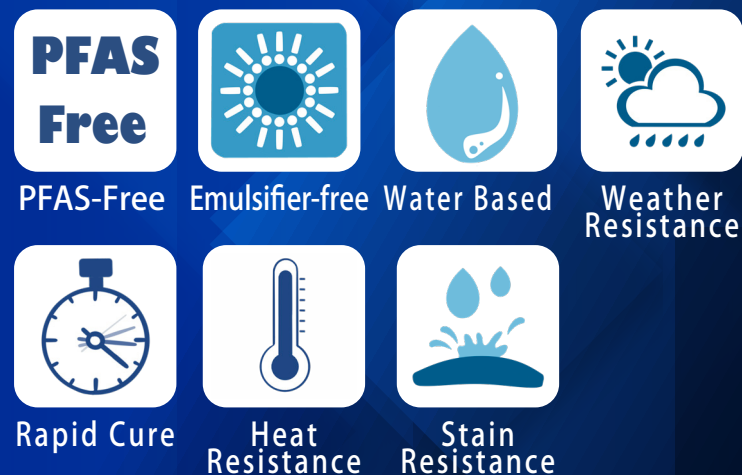
Usage ①	Silicone Based Resins
Usage ②	Resin Hybridization Agents
Usage ③	Surface Modifiers for Coating
Usage ④	Surface Modifiers for Pigments & Fillers
	Silicone Defoaming Agents

Product Name	Excellent Properties
Usage ① Silicone Based Resins	Apply on the substrate as resin itself.
P3 Room-temperature Curing Water-based Silicone Resin KRW-6004	PFAS Free Emulsifier-free Water Based Weather Resistance Rapid Cure Heat Resistance Stain Resistance
P4 PFAS-free Anti-fouling Coating Agent X-88-2026	PFAS Free Water Repellency Water-sliding Property High Gloss Permanent Marker Stain Resistance Crack Resistance
P5 PFAS-free Thin-film Type Water-repellent Coating Agent X-24-9894B Hydrophilic Coating Agent X-12-1427-30	PFAS Free Water Repellency Water-sliding Property Water-based / Hydrophilic Anti-fouling Anti-fogging

Product Name	Excellent / Imparting Properties
P6 Urethane Acrylate-modified Silicone Oligomer X-40-2761	PFAS Free High Hardness Crack Resistance Heat Resistance Weather Resistance
P7 PFAS-free Solvent-based Water Repellent Agent for Textiles X-62-4595 / X-62-4595PF	PFAS Free Water Repellency
Usage ② Resin Hybridization Agents	Improve other resins and impart them with the properties of silicones.
P8 PFAS-free UV-curable Anti-fouling Additive KJV-1000A / KJV-1001A	PFAS Free Water and Oil Repellency Slip Property
P9 PFAS-free Anti-fouling Additive for Acrylic Paints X-26-5084	PFAS Free Water and Oil Repellency
Usage ③ Surface Modifiers for Coating	Modify the surface conditions of coatings.

※ This brochure does not list surface modifiers for coatings.

Usage ④ Surface Modifiers for Pigments & Fillers	Modify the surface of fillers to improve coating performance.
P10 Amino Modified Organopolysiloxane Powder X-88-491A	PFAS Free Adhesion Strength Improvement
Silicone Defoaming Agents	Eliminate foam and suppress foam generation.
P11 PFAS-free Solvent-based Defoamer KS-7719 Series	PFAS Free Defoaming property



Room-temperature Curing Water-based Silicone Resin

Product Usage

Silicone Based Resins

KRW-6004

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

■ Features and Benefits

- It is a water-dispersed type of silicone resin.
- A film is formed as the water evaporates at room temperature.
- **No emulsifiers are used, and a 100%** silicone film can be formed.
- Curing proceeds at room temperature, and it forms a high-hardness film.
- Curing time can be shortened by heating.
- It forms a film with excellent weather resistance, heat resistance, and stain resistance.

■ Applications

- Topcoat for building materials
- Coatings for photocatalyst applications, etc.

■ General Properties

Product name	KRW-6004	KRW-6002	KRW-6001	KRW-6000
Type	Methyl	Methyl/Phenyl	Methyl	Methyl
Film hardness	Hard	Soft	Soft	Hard
Recommended film thickness	<10 μ m	<100 μ m	<50 μ m	<10 μ m
Features	Good room-temperature curability	Good compatibility with organic resins	Forms a soft film	Standard product

※All products are water-based types with approximately 30% active ingredient, and pH is around 7–9.

(Not specified values)

■ Recommended Additives When Coating is Difficult

- Thickener: Cellulose-based thickeners, etc. (e.g., SM-8000※¹)
- Leveling agent: Water-based leveling agents (e.g., KP-120)

Substrate	Glass	Steel sheet	PC	PET	PVC
Product name					
KRW-6000 (Viscosity: approx. 10 cs)	+	±	-	-	±
KRW-6000 + thickener + leveling agent※ ² (Viscosity: approx. 200 cs)	+	+	+	+	+

Film thickness: approx. 6 μ m; coating appearance evaluated visually.

+: Good ±: Partial cissing -: Cissing over the entire surface

※¹ SM-8000: Metolose manufactured by Shin-Etsu Chemical Co., Ltd.

※² Leveling agent: SM-8000 added at 0.02 wt%, KP-120 added at 0.1 wt%

■ Room-Temperature Curability

Product name	KRW-6004	KRW-6000
Item		
Pencil hardness (750 g load)	H~2H	3B~2B
Acetone rubbing, cycles	50<	<10
Toluene rubbing, cycles	50<	<30
Scratching with fingernail	No scratches	Scratches observed
Heat resistance 150° C × 4 h	±	+

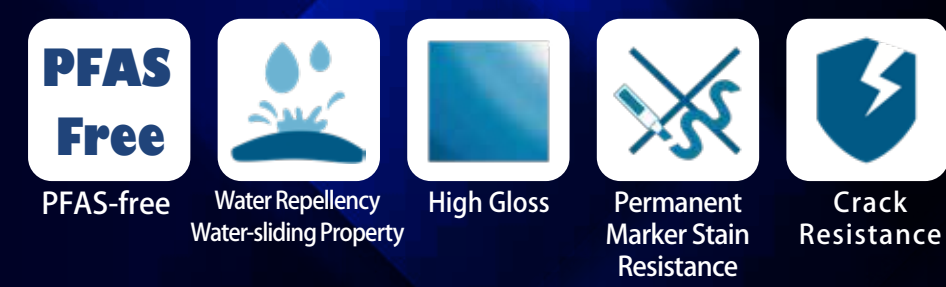
Substrate: Glass; Film thickness: 6 μ m; Curing conditions: dried at room temperature for 3 days (Not specified values)
Heat resistance: +: Good ±: Cracks occurred at edges

PR POINT

Compared with other KRW-6000 series products, it has superior room-temperature curability. Therefore, an excellent coating film with **high hardness, solvent resistance, and scratch resistance** can be obtained by room-temperature drying.

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PFAS-free Anti-fouling Coating Agent



Product Usage

Silicone Based Resins

X-88-2026

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Features and Benefits

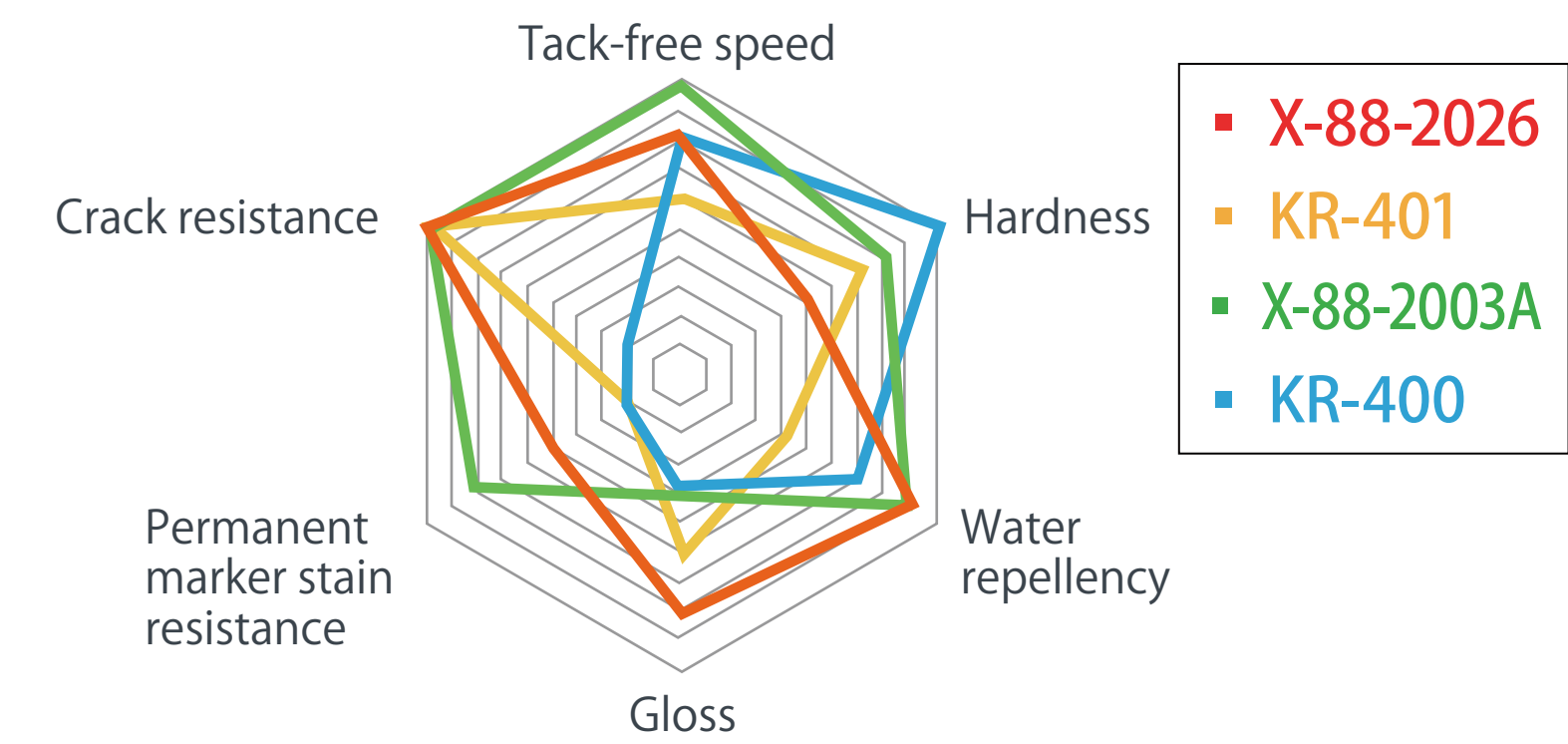
- It is a one-component condensation-cure type methyl / phenyl silicone oligomer (dealcoholization type).
- Compared with the existing product KR-401, it offers superior water repellency and water-sliding property.
- Higher gloss compared with KR-400 and X-88-2003A.
- It exhibits permanent marker stain resistance by heat curing.

General Properties

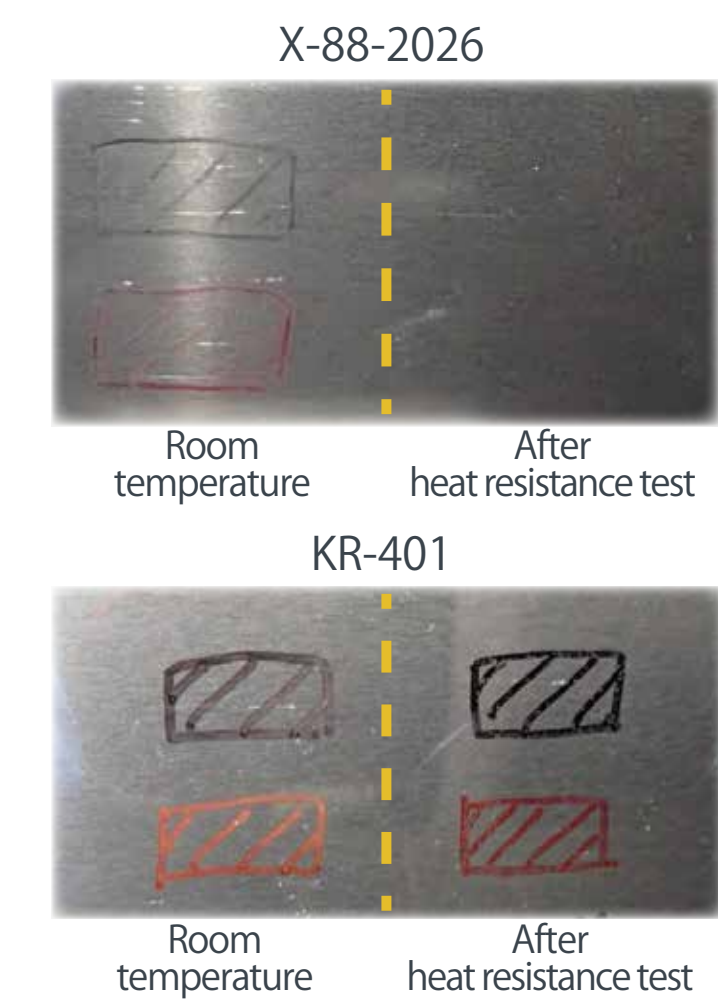
Product name		X-88-2026	KR-401	X-88-2003A	KR-400
Item					
Organic substituent		Methyl/Phenyl	Methyl/Phenyl	Methyl	Methyl
Tack-free	h	1.0	1.5	0.5	1.0
Pencil hardness (after 7 days)		B	3H	4H	8H
Water contact angle※1	2 μL °	103	84	107	92
Water sliding angle※2	20 μL °	24	51	27	32
Gloss	20°	69	59	39	45
Crack resistance	Room temperature	○	○	○	○
	After heat resistance test※3	○	○	○	×
Permanent Marker Stain Resistance	Room temperature	△	×	○	×
	After heat resistance test※3	○	×	○	×

※1 Water contact angle: the higher, the better. ※2 Water sliding angle: the lower, the better. ※3 Heated at 150°C × 2 h (Not specified values)

Comparison with General-Purpose Silicone Oligomers



Permanent Marker Stain Resistance (Substrate: Polished SteelSheet)





PFAS-free Thin-film Type Water-repellent / Hydrophilic Coating Agents

Product Usage

Silicone Based Resins

Contact → Sales and Marketing Department II
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Water-Repellent Coating Agent X-24-9894B

■ Features and Benefits

- X-24-9894B can be used as a water-repellent and water-sliding coating agent.
- This is a silicone-based water repellent.
By introducing a special structure, it offers high reactivity (initial performance) and high durability.
- Apply it to inorganic substrates (e.g., glass) by wiping, then wipe to form a thin water-repellent film.
- PFAS-free material.

■ General Properties

Product name		X-24-9894B
Item		
Viscosity	mm ² /s	2
Active ingredient	wt%	6
Solvent		Isododecane

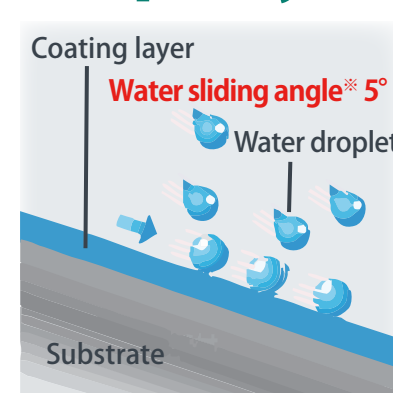
(Not specified values)

■ Excellent Water Repellency



※ Water contact angle: the higher the value, the better.

■ Excellent Water-sliding Property



※ Water sliding angle: the lower the value, the better.

■ Test Data

【 Test method 】 Apply X-24-9894B to a polished substrate and wipe off; after drying at room temperature for 12 hours, measure by dropping water onto the specimen.
(The time required for water repellency to develop can be shortened by heating or using a catalyst.
Example catalyst: use a cloth squeezed after being moistened with acid for wipe-off.)

Water droplet volume: Contact angle = 2 μ L; Sliding angle = 20 μ L

Product name	Water repellency		Durability test: 85°C / 85%RH × 7 days No change in performance	Water-sliding property	
	Water contact angle	Water sliding angle		Water contact angle	Water sliding angle
X-24-9894B	105 ° 	5 ° 		105 ° 	5 °

(Not specified values)

Hydrophilic Coating Agent X-12-1427-30

■ Features and Benefits

- Unlike general surfactant-based hydrophilizing agents, it adheres to inorganic substrates (e.g., glass) and has excellent water resistance.
- Water-based material.
- Can be hydrophilized simply by diluting with water, applying at room temperature, and air-drying.
- Hydrophilization is possible with an nm-level thin film.

■ Applications

- Hydrophilization of inorganic substrates (e.g., glass);
imparting anti-fogging performance and hydrophilic anti-fouling properties

■ General Properties

Product name	Active content wt%	Solvent	Appearance 25° C	Viscosity 25° C mm ² /s	Standard curing conditions
X-12-1427-30	30	Water	Pale yellow liquid	11	25°C×24hor 55 °C×2h (Recommended film thickness: 10 to 20 nm)

(Not specified values)

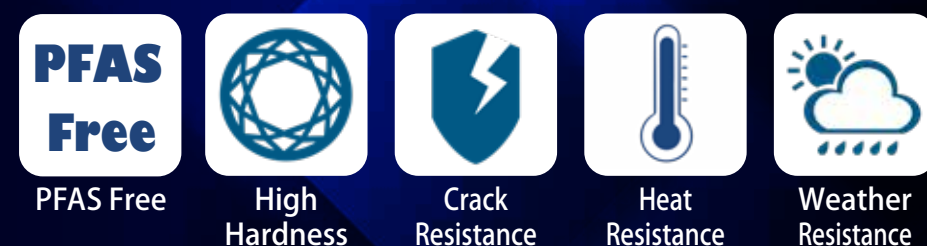
■ Evaluation Results of Anti-fog Coating

Substrate: polished glass plate. X-12-1427-30 was diluted to 5 wt% and wipe-coated; dried at 55°C × 2 h; film thickness: 10 nm.

Anti-fogging agent	X-12-1427-30	Other company product (surfactant-based)	Uncoated
Initial anti-fogging			
2 μ L water contact angle	2	10	50
Anti-fogging after 24 h water immersion			
2 μ L water contact angle	2	40	50

(Not specified values)

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Urethane Acrylate-modified Silicone Oligomer

Product Usage

Silicone Based Resins

Resin Hybridization Agents

X-40-2761

Contact → Sales and Marketing Department II
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Features and Benefits

- Enables formation of a coating film with high hardness and high flexibility.
- Can be used as a modifier for other radical-curable resins.
- High silicone content* enables resin modification even with small addition.

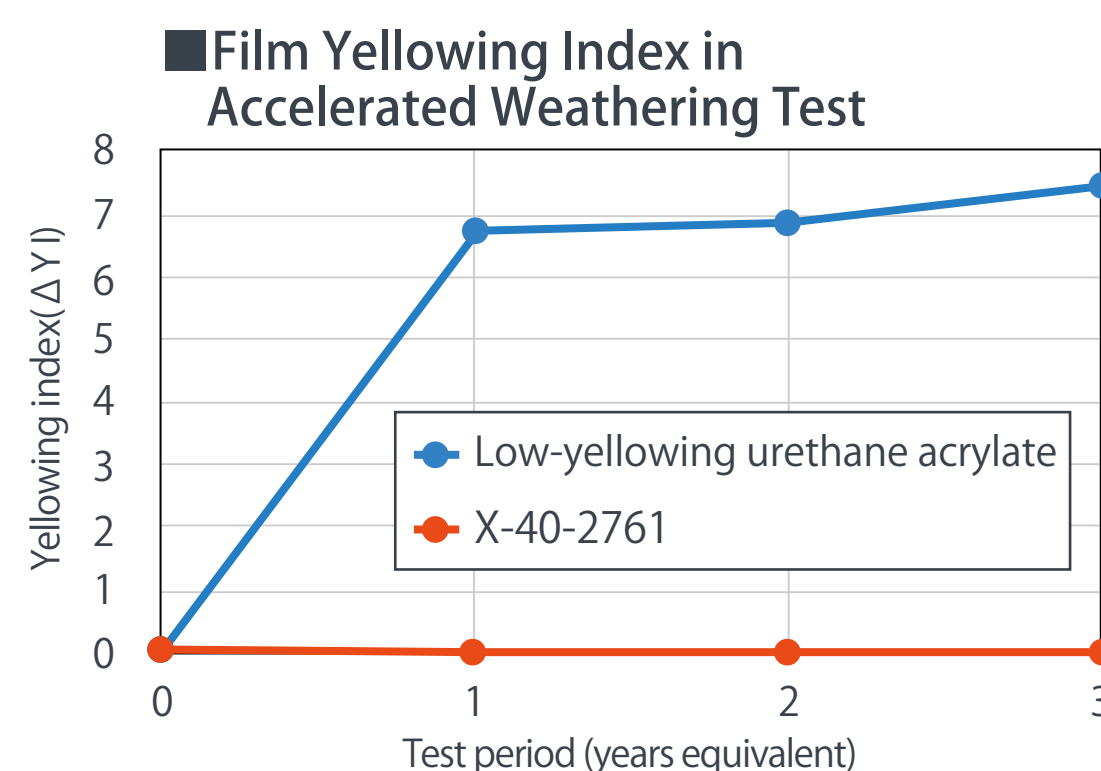
*Ratio excluding organic functional groups such as acrylic structures from the molecule.

Applications

- Modifier for radical-curable resins.
Expected effects: improved weather resistance, improved yellowing resistance, etc.
- Flexible hard coating

Properties of Standalone Film

- High hardness
Pencil hardness (750 g load): 4H
- Good flex resistance
Mandrel test: 2mm ϕ
- Good yellowing resistance
Resistant to heat & UV



Curing conditions: Add 2 wt% photoinitiator (Omnirad 1173) and irradiate with a high-pressure mercury lamp at 600 mJ/cm² under nitrogen atmosphere.
Substrate: PES-coated steel sheet. Film thickness: 50 μ m.
Tested using Iwasaki Electric Co., Ltd. Super UV Tester W-151 (120 hours of testing corresponds to 1 year of outdoor exposure).

General Properties

Item Product name	Active content wt%	Viscosity mPa·s	Acrylic equivalent g/mol	Photoinitiator
X-40-2761	100	1,000	330	Not included

(Not specified values)

Example of Resin Modification

■ Cured film properties: X-40-2761 added to a commercially available UV-curable acrylic acrylate

Blend ratio Acrylic acrylate / X-40-2761	100/0	90/10	80/20
Pencil hardness (750 g load)	H	2H	2H
Water contact angle (2 μ L) °	70	94	97
Hexadecane contact angle (2 μ L) °	14	40	41
Δ HAZE immediately after scratch resistance test* ¹	40	20	10
Gloss retention rate after Accelerated weathering test* ² (Equivalent to 3 years of field exposure) %	89	98	100

(Not specified values)

Curing conditions: Add 2 wt% of photoinitiator Omnirad 1173 and irradiate with a high-pressure mercury lamp at 600 mJ/cm² under nitrogen atmosphere.

Substrate: Glass

Film thickness: approx. 50 μ m.

*¹: Δ HAZE test: Steel wool No. 0000, 300 g load, 10 reciprocating cycles.

*²: Accelerated weathering test: Tested using Iwasaki Electric Co., Ltd. Super UV Tester W-151 (120 hours of testing corresponds to 1 year of outdoor exposure).

PFAS-free Solvent-based Water Repellent Agent for Textiles

X-62-4595 / X-62-4595PF

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

■ Features and Benefits

- Water repellency is developed by dipping and drying.
- It can be used for various fabrics such as cotton and polyester.

■ How to Use

- 1) Dilute to an active content of about 0.5 to 5%, immerse the fabric, and dry.
- 2) Drying conditions are from room temperature to 150°C for several minutes to several tens of minutes.
- 3) It can be diluted with IPA or hydrocarbon solvents.

■ General Properties

Product Name	Active Content wt%	Solvent	Appearance	Viscosity mPa·s, 25°C
X-62-4595	50	IPA	Pale yellow transparent liquid	20
X-62-4595PF	50	Isoparaffin	Pale yellow transparent liquid	10

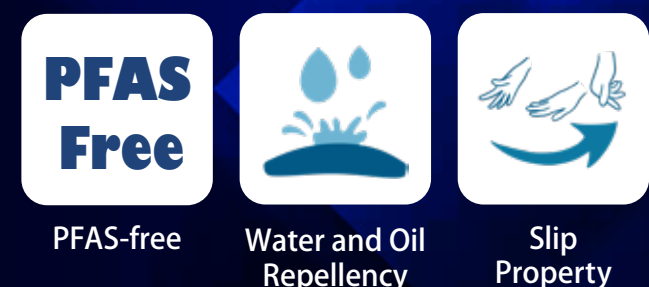
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■ Water Repellency Appearance



Treatment conditions: Polyester was used as the base fabric, immersed in a treatment bath diluted to 1% active content, squeezed, allowed to stand for 30 minutes, and then heat-treated at 105°C for 2 minutes.

Evaluation of water repellency: A spray test based on JIS L 1092 was conducted. The untreated fabric showed water repellency grade 1, while the treated fabric showed grade 4 or higher.



PFAS-free UV-curable Anti-fouling Additive

Product Usage

Resin Hybridization Agents

KFV-1000A / KFV-1001A

Contact → Sales and Marketing Department I
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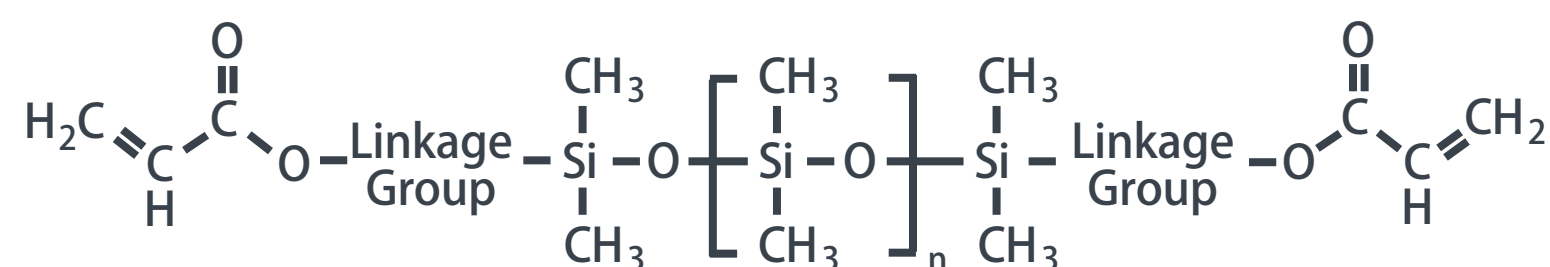
■ Features and Benefits

- Applicable to UV-radical curing coatings.
- More compatible with acrylic monomers and resins than conventional acrylic-modified silicone fluids, due to the high polarity of the linkage groups.
- Excellent UV-curing properties, requiring only a small amount of irradiation to cure.
- Enhancing lasting water and oil repellency

■ Applications

- Water- and oil-repellent and slip agents for acrylic resins and radical-curing resin

■ Chemical Structure



■ Properties and Product Position

Item	Reference	KFV-1000A	KFV-1001A
Solubility	±	+	+
UV curability	±	+	++

※ ++ : Excellent + : Good ± : Relatively poor

■ Test Data

Addition to acrylic monomer-based UV coating agents.

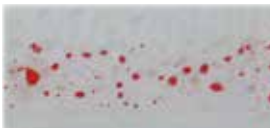
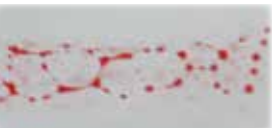
【Formulation】

Composition	Parts by weight
Multi functional acrylic monomer	100
Silicone	2
Photoinitiator	2

【Test Method】

1. The composition liquid is applied to PMMA substrates (film thickness 8μm).
2. UV irradiation under nitrogen atmosphere (UV-LED(365 nm); 1400 mJ/cm²)
3. Various tests are conducted

【Test Results】

Item		Blank	After silicone addition		
			Reference	KFV-1000A	KFV-1001A
Appearance	Transparency	+	±	+	+
	Smoothness	+	-	+	+
Contact angle [※]	Water	40	97	96	95
	Oleic Acid	15	49	51	51
Permanent marker cissing					

※ The higher the value, the better the performance.
+ : Good ± : Relatively poor - : Poor

(Not specified values)

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PFAS-free Anti-fouling Additives for Acrylic Paints

Product Usage

Resin Hybridization Agents

X-26-5084

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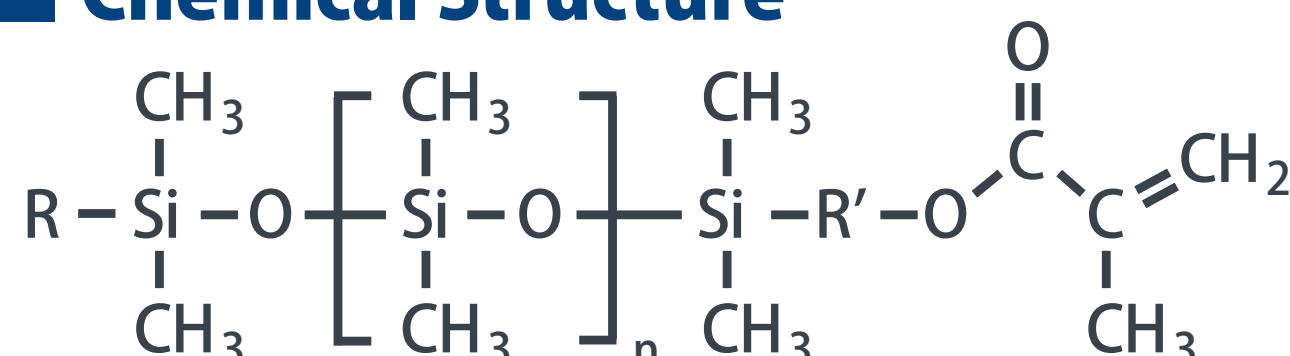
■ Features and Benefits

- By incorporating X-26-5084, the water repellency and oil repellency of the acrylic resin are greatly improved.

■ Applications

- Water-repellent and oil-repellent agent for acrylic resin

■ Chemical Structure



■ General Properties

Parameter	Product name	X-26-5084
Appearance		Colorless transparent liquid
Viscosity at 25°C	mm ² /s	60
Specific gravity at 25°C		0.97
Refractive index at 25°C		1.405
Functional Group Equivalent	g/mol	4,500

(Not specified values)

■ Test Data

Making copolymerization film of methacrylic monomers

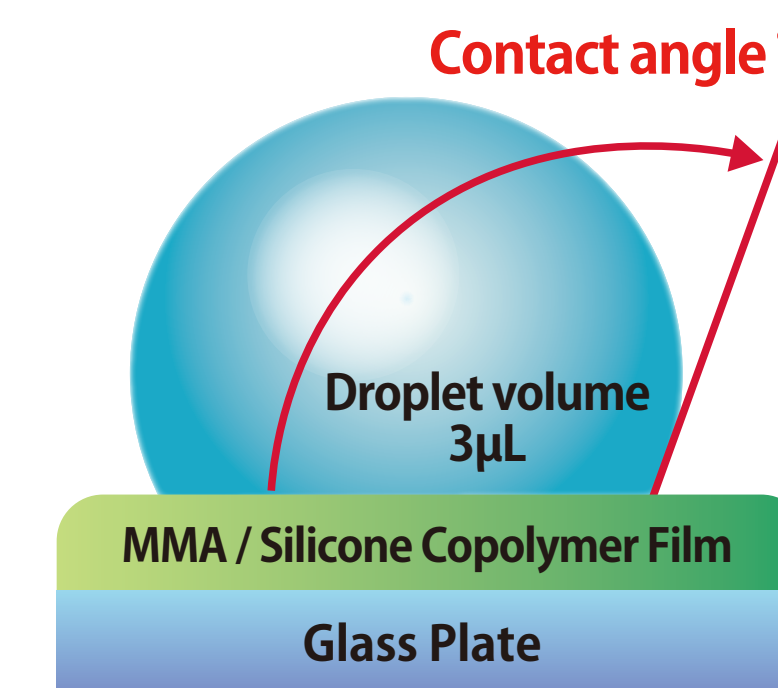
【 Formulation 】

Composition	Parts by weight
MMA	70
X-26-5084	30
Solvent	100
Polymerization initiator	1

【 Test Method 】

- The acrylic composition is solution polymerized.
- Polymerization liquid is applied to a glass plate (film thickness after drying : 3μm)
- Add 3 μL of water and oleic acid and measure the contact angle

【 Contact Angle Image 】



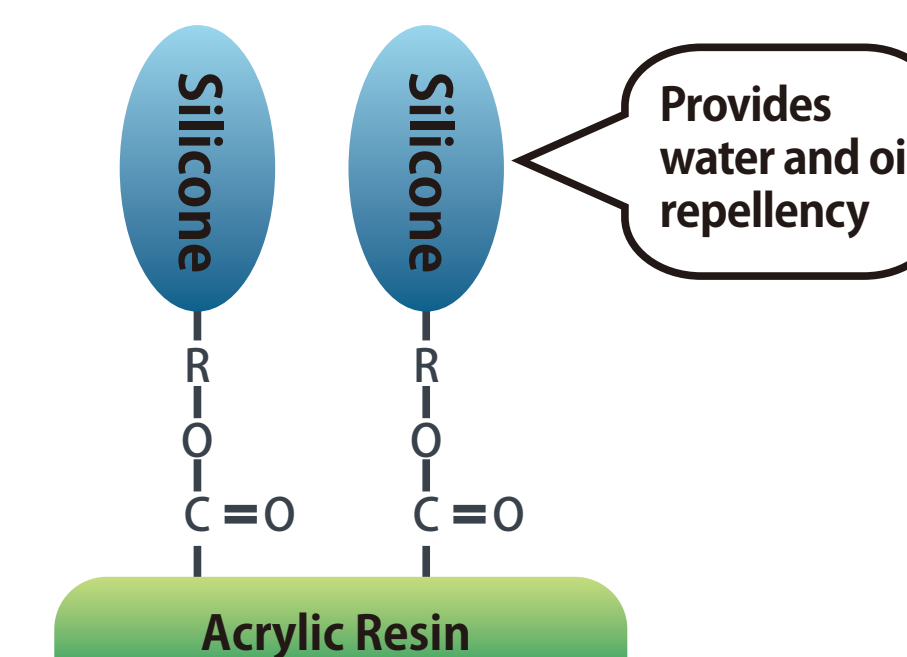
【 Test Results 】

Parameter	Silicone content	Contained	Not Contained
Appearance		Colorless transparent	Colorless transparent
Water Contact Angle※ °		101	69
Oleic Acid Contact Angle※ °		32	7

※ The higher the value, the better the performance.

(Not specified values)

■ Resin Modification Model





Amino Modified Organopolysiloxane Powder

Product Usage

Resin Hybridization Agents

Surface Modifiers
for Pigment & Fillers

X-88-491A

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

■ Features and Benefits

- Due to the presence of primary amino and silanol groups in its structure, it can bond with various organic and inorganic materials.
- Classified as a non-hazardous (designated combustible) material under Japan's Fire Service Act, it provides superior safety.
- This is an environmentally friendly product that does not emit VOCs.

■ Applications

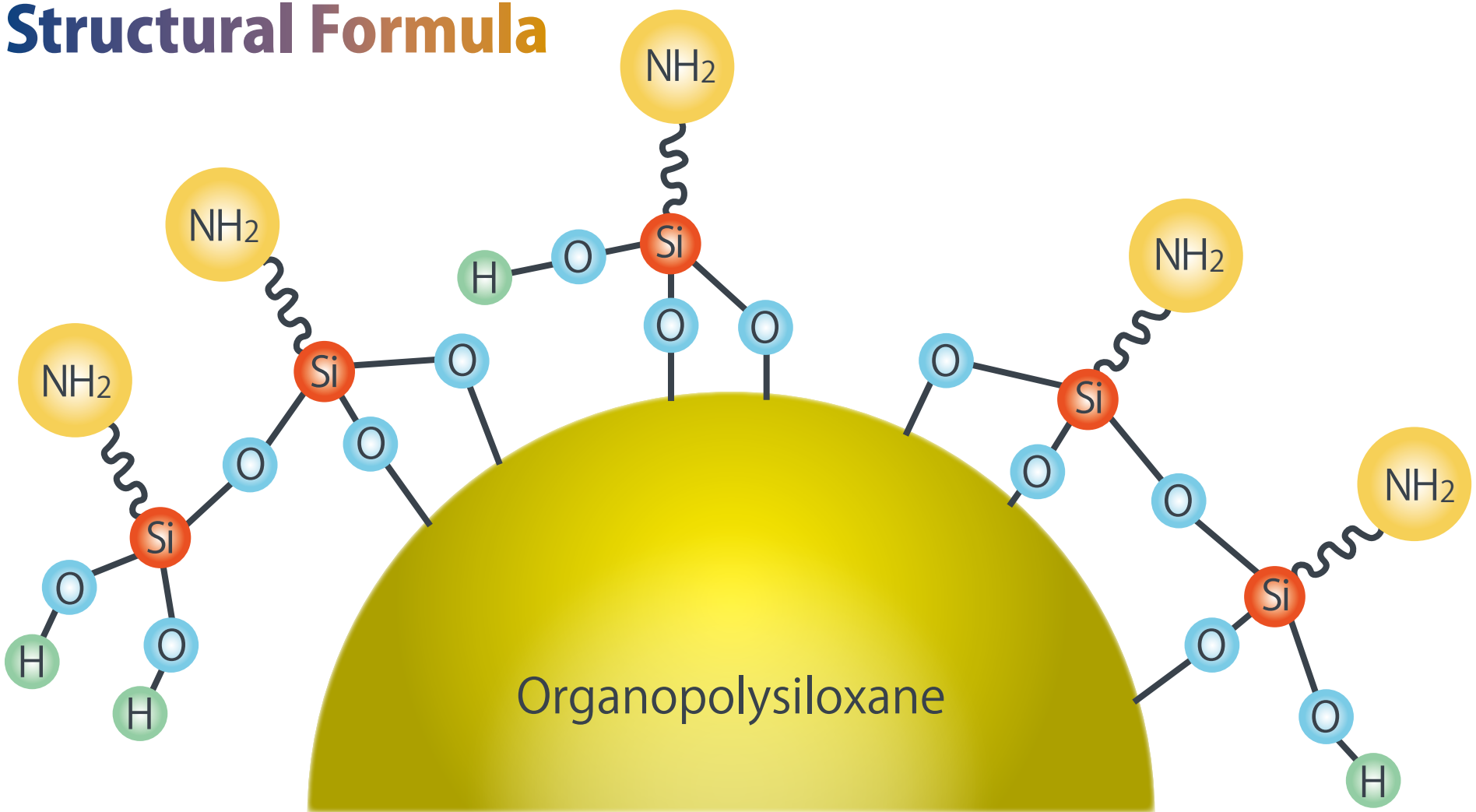
- Resin additive (improves adhesion and strength)
Applicable resins : Epoxy, Acrylic, Polycarbonate, Urethane, Nylon, Phenolic, Furan, Polyimide, Melamine and others

■ General Properties

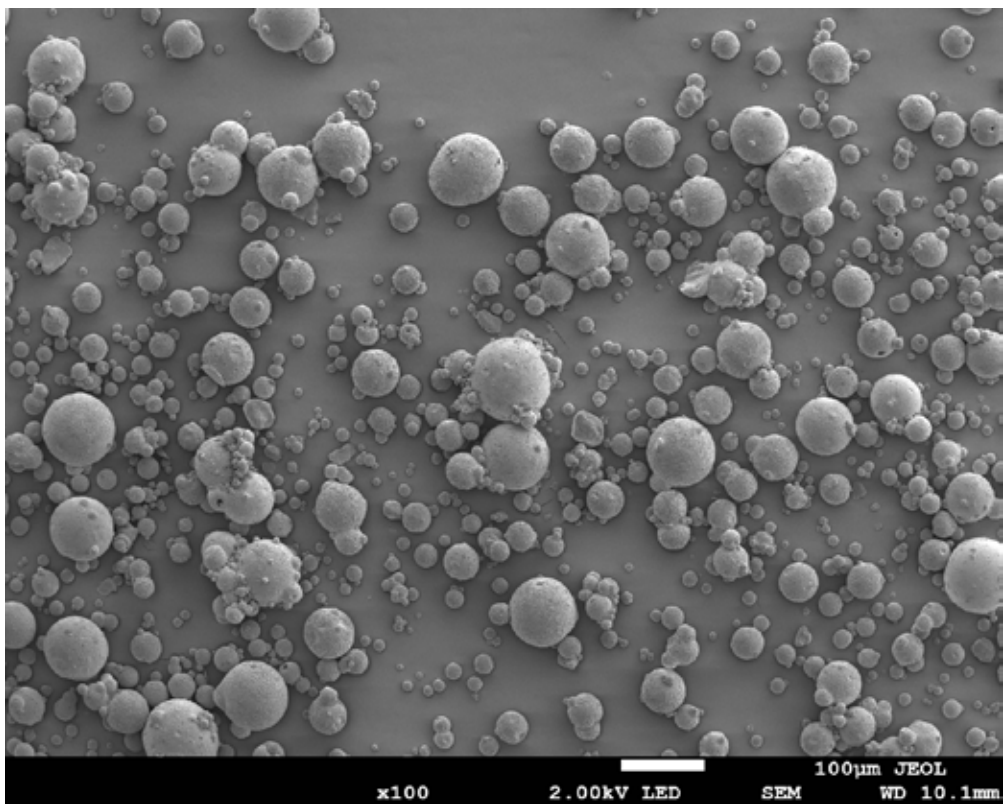
Product Name		X-88-491A
Parameter		
Active ingredients	%	>99
Appearance		White solid
Particle size	μm	30~150
Melting point		N / A
Flash point	°C	>100 (Closed Cup)
Amine value	KOH mg/g	488

(Not specified values)

■ Structural Formula



■ SEM Image





PFAS-free Solvent-based Defoamer

Product Usage

Silicone Defoamer

KS-7719 Series

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

■ Features and Benefits

- Fluorine-free
- Defoaming performance equivalent to fluorinated defoamers can be expected in the applications below.

■ Applications

- Solvent-based inks
- Solvent-based paints

■ General Properties

Product Name			KS-7719A	KS-7719B	KS-7719C	KS-7719D	Competitor Non-fluorinated Defoamer	Competitor Fluorinated Defoamer
Item								
Composition	Defoaming component	30%	Non-fluorine-containing silicone					
	Diluting solvent	70%	Isoparaffinic hydrocarbon					
Appearance			Colorless transparent liquid					
Viscosity at 25° C		mPa·s	18,000	2,500	3,000	3,000		
Active content		%	30	30	30	30		
Defoaming property			+	+	+	+	±	+
Cissing			+	+	+	+	-	+

(Not specified values)

■ Image of Paints and Inks



※This is an AI-generated image.

■ Ink Print Appearance



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



Gunma Complex	ISO 9001	ISO 14001
	(JQA-0004)	(JQA-E-0002)
Naoetsu Plant	ISO 9001	ISO 14001
	(JQA-0018)	(JQA-E-0064)
Takefu Plant	ISO 9001	ISO 14001
	(JQA-0479)	(JQA-EM0298)

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