



Shin-Etsu Silicone

SEALANT



Shin-Etsu silicone sealants are highly weather resistant and durable.

Our silicone-based sealants can be applied to various types of joints such as glazing, sashes and perimeter joints.

Shin-Etsu Chemical Co., Ltd. is a leading manufacturer of silicone products in Japan and is the nation's largest manufacturer of silicone sealant.

Our numerous achievements and wealth of experience in the building industry are a source of valuable feedback which we then incorporate into our silicone sealant manufacturing processes.

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CHARACTERISTICS

The main characteristics of Shin-Etsu silicone sealants are:

- 1 SUPERIOR WEATHER RESISTANCE AND DURABILITY**
Our sealants are highly resistant to extremes in temperature, moisture, ozone and ultraviolet rays. They do not become discolored or crack when exposed to the elements, no matter how harsh. Semipermanent sealing can be achieved when the sealant is applied properly.
- 2 SUPERIOR ADHESIVENESS**
Our sealants will adhere to almost all materials when used with an appropriate primer.
- 3 EASY TO HANDLE**
These one-component sealants are easy to apply using an extrusion cartridge.
- 4 SALT RESISTANT**
Our sealants can be used in buildings and plants located in coastal regions because silicone rubber has superior salt resistant properties and is extremely durable.
- 5 A HUGE LINE UP TO CHOOSE**
We have sealants that are flame retardant, transparent and resistant to mold so you can choose the optimal sealing material to meet your needs.



Outdoor exposure test



Pull test



Sunshine weather meter test

Selection Guide

For use with/in	Grade	SEALANT-A	SEALANT-N	SEALANT-456	SEALANT-4588	PURE-SEALANT	SEALANT-40	SEALANT-420
Glass		○	○	○				○
Sashes		○	○	○				
Metal		○	○	○				
Suspension construction		○	○	○				
Mortar			○	○				
Marble or stone			○	○				
Prefab housing		○	○					
Aluminum curtain walls				○				
Movement joints				○				
Glass water tanks		○						
Plastics		○	○	○				
Kitchens, bathrooms and sinks					○			
Refrigerators					○			
Clean rooms					○	○		
Fire zone boundaries							○	

PRODUCT LINE UP



SEALANT-A

SEALANT-A is a one-component high modulus acetox curing sealant. This sealant is particularly resistant to extremes in temperature, moisture, ozone and ultraviolet rays. SEALANT-A does not become discolored or crack when exposed to the elements, no matter how harsh. It will adhere to almost all materials, when used with an appropriate primer. SEALANT-A is especially suitable for sealing small glass fish tanks.

SEALANT-A meets the following standards:

- ASTM C 920-01 Type S, Grade NS, Class 12 1/2
- GB/T 14683-93 8020 G, N
- BS 5889 : 1989, Type B

Characteristics	<ul style="list-style-type: none"> • High modulus • Superior adhesiveness • Quick hardening
Can be used with	<ul style="list-style-type: none"> • Glass • Sashes • Suspension construction • Glass water tanks • Plastics
Packaging	Cartridge (300 ml)
Colors	Translucent, White, Gray, Aluminum and Black



SEALANT-N

SEALANT-N is a one-component high modulus neutral (oxime) curing sealant. This sealant starts curing upon exposure to moisture in the air as it is extruded from the cartridge. Unlike conventional sealants, SEALANT-N gives off no acetic acid odor and is also suitable for use with various types of metal, concrete and stone, in addition to glass and tile. It is especially suitable for interiors because of the lack of odor.

SEALANT-N meets the following standards:

- ASTM C 920 Type S, Grade NS, Class 25
- GB/T 14683-93 8020 F, N •JIS A 5758-97 G-F 20LM
- BS 5889 : 1989, Type B

Characteristics	<ul style="list-style-type: none"> • High modulus • Non-corrosive
Can be used with	<ul style="list-style-type: none"> • Glass • Sashes • Metal • Suspension construction • Mortar • Marble • Prefab housing units
Packaging	Cartridge (310 ml)
Colors	Translucent, White, Gray, Light Gray, Soft Gray, Ivory, Dark Ivory, Amber, Aluminum, Dark Brown and Black





SEALANT-456

SEALANT-456 is a one-component medium modulus neutral (oxime) curing sealant. This sealant starts curing upon exposure to moisture in the air as it is extruded from the cartridge. This sealant does not give off an odor because it uses oxime in curing process, and it will adhere to almost any material. It can be used to achieve the high level of adhesion required in weather sealing of joints, glass curtain wall joints, glazing for dot points, metal butt joints and perimeter joints, and it can be used safely on heat reflecting glass and metals.

SEALANT-456 meets the following standards:

- ASTM C 920-01 Type S, Grade NS, Class 50 •GB/T 14683-93 8020 F, N
- JIS A 5758-97 G-F 25LM •BS 5889 : 1989, Type A

Characteristics	<ul style="list-style-type: none"> • Medium modulus • Good elasticity • Superior adhesiveness
Can be used with	<ul style="list-style-type: none"> • Glass • Aluminum curtain walls • Sashes • Movement joints • Metal • Suspension construction • Prefab housing units
Packaging	Cartridge (310 ml)
Colors	Dark Brown, Black, Gray, Light Gray, and Beige



SEALANT-4588

SEALANT-4588 is a one-component high modulus neutral (oxime) curing silicone sealant. It is especially suited for areas where mold is likely to be a problem such as in kitchens, bathrooms, sinks, refrigerators and clean rooms because of its superior anti-mold properties. SEALANT-4588 is not suitable for sealing fish tanks.

SEALANT-4588 meets the following standards:

- JIS A 5758-97 G 30SLM

Characteristics	<ul style="list-style-type: none"> • High modulus • Anti-mold
For use in areas where mold is likely to appear	<ul style="list-style-type: none"> • Kitchens • Bathrooms • Sinks • Refrigerators • Clean rooms
Packaging	Cartridge (330 ml)
Colors	White, Ivory, Dark Ivory, Light Gray and Translucent





PURE-SEALANT

PURE-SEALANT is a one-component neutral (oxime) curing silicone sealant. It combines the superior properties of a silicone sealant while levels of low molecular siloxane emissions are cut drastically. These properties makes it an optimal sealant for interior joints and air filters in super-clean rooms which require the highest level of cleanliness.

Characteristics	<ul style="list-style-type: none"> • Reduced levels of low molecular siloxane emissions • Superior adhesiveness
For use in	<ul style="list-style-type: none"> • Interior joints and air filters in clean rooms
Packaging	Cartridge (330 ml)
Colors	White, Light Gray, Ivory, Dark Ivory and Translucent



SEALANT-40

SEALANT-40 is a one-component silicone sealant which is specified for use with Category B aluminum fire doors approved under the guidelines of the Japan Sealant Industry Association. As well as being weather resistant and durable, this sealant is also flame retardant which makes the optimal sealant for areas which demand fire resistance such as fire doors, fire zones, emergency stairwells and emergency exits. SEALANT-40 is suitable for glazing joints between glass and aluminum sashes.

Characteristics	<ul style="list-style-type: none"> • High modulus • Flame retardant
For use with	<ul style="list-style-type: none"> • Fire doors • Fire zone sealing
Packaging	Cartridge (330 ml)
Colors	White, Gray, Black and Dark Brown





SEALANT-420

SEALANT-420 is a one-component high modulus acetic curing silicone sealant. This sealant is super-transparent which makes it the optimal sealant to use in areas which require an aesthetically-pleasing clear seal such as around glass and display cases. SEALANT-420 is suitable for the sealing of jewelry shop showcases and boutique glass partitions, etc. SEALANT-420 does not adhere well to materials unless appropriate primer is applied.

Characteristics	<ul style="list-style-type: none"> • High modulus • Super-transparent
For use with / in	<ul style="list-style-type: none"> • Glass • Areas which require an aesthetically-pleasing clear seal
Packaging	Cartridge (330 ml)
Colors	Super-transparent



Product List

	SEALANT-A	SEALANT-N	SEALANT-456	SEALANT-4588	PURE-SEALANT	SEALANT-40	SEALANT-420
Uses	Glass	General	General	Damp areas	Super clean rooms	Fire zones	Display cases
Characteristics	Quick curing	Corrosion resistant	Good elasticity	Anti-mold	Reduced emissions	Flame retardant	Super transparent
Curing system	Acetoxy	Oxime	Oxime	Oxime	Oxime	Oxime	Acetoxy
Before curing							
Appearance	Paste	Paste	Paste	Paste	Paste	Paste	Paste
Fluidity	Non-Sagging	Non-Sagging	Non-Sagging	Non-Sagging	Non-Sagging	Non-Sagging	Non-Sagging
Tack free time at 23°C in minutes	5	6	20	5	3	15	5
After curing (JIS K 6249)							
Appearance	Elastic	Elastic	Elastic	Elastic	Elastic	Elastic	Elastic
Density at 23°C g/cm ³	1.03	1.04	1.26	1.03	1.05	1.56	1.05
Durometer hardness, Shore A	20	20	25	20	44	60	25
Tensile strength MPa	1.6	1.4	1.5	1.4	2.7	3.4	2.9
Elongation at break %	500	540	600	580	340	300	400

(Not specified values)

PRIMER SELECTION

A primer is used as a base coat to improve the adhesion of a silicone sealant to various materials. Shin-Etsu offers a line up of primers especially developed for different types of materials. We recommend that you prepare the application surface with a primer designed especially for that surface in order to enhance the durability of the application area.

Selection Guide

Application material	Sealant	Primer	Appearance (Solvent)	Drying time at 20°C	Q'ty used g/m ²	Remarks
Glass, metal, enamel, tile, vitreous surfaces and plastics	SEALANT-N SEALANT-456	Primer-C	Clear yellow liquid (Mineral spirits)	Over 15 min.	35	Do not use with concrete, timber or stone
Concrete, stone, marble and timber	SEALANT-N SEALANT-456	Primer-MT	Clear liquid (Toluene, Isopropanol)	Over 30 min.	200	
Plastics	SEALANT-A SEALANT-N	Primer-T	Clear liquid (Toluene, Isopropanol)	Over 15 min.	50	
Glass, metal, enamel, tile, vitreous surfaces and plastics	SEALANT-A SEALANT-N	Primer-AQ-1	Clear yellow liquid (n-Hexane)	Over 30 min.	50	
Plastics	SEALANT-A SEALANT-N	Primer-D-2	Clear liquid (Toluene, Butanol, Ethanol)	Over 30 min.	100	

*Note: SEALANT-456 can be used without primers.

Primer application

- ① Select a primer which is suitable for the construction materials being used.
- ② Thoroughly clean and dry the application surface immediately before primer application.
- ③ Apply the primer using a brush or sprayer of an appropriate size for the joints. Make sure that the primer is applied uniformly and covers the entire application surface.
- ④ Allow the primer to dry completely before application of the sealant.
- ⑤ After primer application, the unused primer must be hermetically sealed and stored in a well ventilated and cool area which is not exposed to direct sunlight.

Warning

Do not touch primer treated surfaces. Primers should always be stored in a closed container and hermetically sealed. Remember that primers are flammable and should be stored only after taking the appropriate precautions.

Theoretical yield per can of primer (250 g)

These figures were calculated assuming application of **Primer C** to a non-porous material.*

Joint depth (mm)	Area primed (m)
6	55
8	42
10	33
15	22
20	17
25	13
30	11
40	8

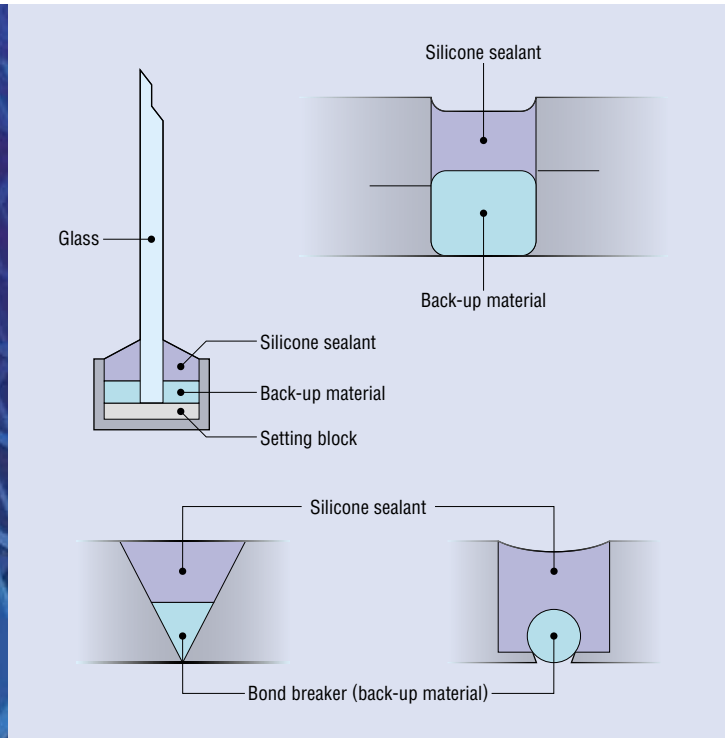
*Allowance for loss was taken into consideration in the calculations.

JOINT DESIGN

Silicone sealant is an elastic material which is fully able to withstand thermal movements due to variations in temperature and structural movements caused by typhoons or earthquakes.

It is important when designing joints to determine the width and depth capable of withstanding the maximum deformation anticipated as a result of joint movement.

- 1 A minimum width and depth of 5 mm are necessary for glass joints. A minimum width and depth of 10 mm are required for metal and concrete joints which can be expected to move.
- 2 A back-up material should be used as a bond breaker to adjust the depth of the sealant at joints and to prevent the sealant from bonding to the bottom of joints.
- 3 The best results can be obtained with back-up material by using a polyethylene foam containing no oils or solvents and which does not adhere to the silicone sealant.
- 4 The bonding area can be increased for concrete and stone joints by using circular back-up materials.
- 5 Make sure to use a bond breaker (back-up material) with triangular-shaped joints.



Joint width

The joint width (W) is generally calculated based on the following equation taking thermal movement into consideration.

$$W \geq \frac{\Delta \ell}{\epsilon} \times 100 + t$$

W : Joint width (mm)

$\Delta \ell$: Joint movement (mm)

ϵ : Sealant material design elasticity (%) or design shear rate (%)

t : Joint width measurement allowance (mm)

$$\Delta \ell = \alpha \times \ell \times \Delta T (1-K)$$

α : material thermal expansion coefficient (1/°C)

ℓ : material design length (mm)

ΔT : material effective temperature difference (°C)

K : material restraint ratio (normally calculated with K=0)

Joint depth

The joint depth is normally calculated within the range of the following equation.

$$\frac{1}{2} \leq \frac{D}{W} \leq 1$$

D: Joint depth (mm)

W: Joint width (mm)

$$W \geq 15 \text{ mm: } \frac{1}{2} W < D \leq \frac{2}{3} W$$

$$W < 15 \text{ mm: } \frac{2}{3} W < D \leq W$$

Minimum and maximum dimensions for sealant joints

Joint dimensions	Minimum (mm)		Maximum (mm)	
	Width	Depth	Width	Depth
Glazing	5	5	30	20
General uses	10	10	40	20

*A depth to width ratio of 1:1 to 1:1.5 is generally appropriate for sealant depth at joints.

Standard application, SEALANT 456

Cartridge (310 ml)

Joint width (mm)	Joint depth (mm)					
	4	5	6	8	10	12
4	14.5					
5	11.6	9.3				
6	9.7	7.8	6.5			
8	7.3	5.8	4.8	3.6		
10		4.7	3.9	2.9	2.3	
12			3.2	2.4	1.9	1.6
15			2.6	1.9	1.6	1.3
20					1.2	1.0

*25% loss assumed

Design elasticity % and design shear % (glazing)

Products	SEALANT-N, SEALANT-4588	
Elasticity (%)	M1	10
	M2	15
Shear (%)	M1	20
	M2	30

*M1: when movement is taken into consideration because of temperature changes

M2: when movement is taken into consideration as a result of wind pressure and earthquake

PREPARATION and SEALING

Preparation before starting application

1. Checking the construction design

The following items should be confirmed in advance with the aid of drawings or other means to check the appropriateness of the sealant to the construction design and the dimensions of the joints.

- ① Are the joints designed to resist expansion and contraction?
- ② Can the back-up materials and tapes be satisfactorily set in place?
- ③ Are there any problems with constructability such as gunning or finishing?

2. Checking the width and depth of joints

A minimum of 10 mm is required for both the width and depth of movement joints.

3. Checking adhesion surfaces

Adhesion strength is greatly affected by the condition of the surfaces to which the sealant is to be applied. These surfaces should be checked carefully and the following items taken into consideration.

- ① What material is the sealant to be applied to?
- ② Is there any damage to or contaminants on the surfaces?

4. Sample testing prior to application

An adhesion test using a small sample prior to use is highly recommended.

5. Preparation of materials

- ① Decide upon the type and color of sealant to be used.
- ② Make sure that you have enough primer to cover the area to which the sealant will be applied.
- ③ Procure back-up material appropriate for the joint dimensions and construction.
- ④ Select appropriate masking tape that will prevent the adhesive agent from getting onto surfaces.
- ⑤ Select a solvent such as toluene, methyl ethyl ketone or acetone that will not damage the application surfaces to clean the joints.

An alcohol-based solvent should never be used.

✓ Tool Check List

- Caulking gun
- Finishing spatula
- Priming brush
- Air compressor for joint cleaning (depending on site conditions)
- Cloths
- Safety and protective equipment
- Solvents such as toluene, methyl ethyl ketone or acetone

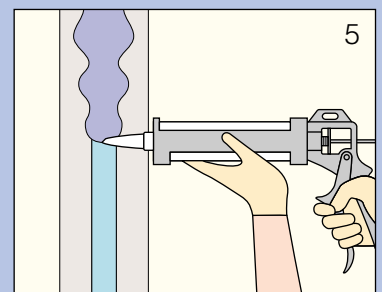
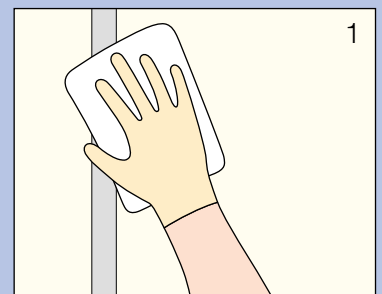
Sealing

1 Preparation of joints and cleaning of work surfaces

Since the demands placed on silicone sealants are higher than on other sealing material, it is absolutely essential that great care be taken in preparing the joint surface. Chips and cracks should be fixed, accumulated gravel and stones should be removed and cold joints should be warmed. Dirt can be removed using an air compressor or wiping with a cloth. Moisture, laitance and oil will prevent adhesion and cause interface separation and thus must be completely removed. Wipe smeared surfaces with a cloth using a solvent such as toluene or methyl ethyl ketone. Make absolutely certain that the joint surface is dry before moving onto the next step.

2 Insertion of back-up material

Back-up material is required to ensure that the joint is of the appropriate depth and as a bond breaker to prevent triangular adhesion of the sealant. This material is also used to eliminate internal stress and increase durability.



3 Application of masking tape

Apply masking tape to both sides of the joint to prevent the sealant from adhering to the area around the joint and to ensure a clean finish in the sealant-filled areas. Even pressure should be applied to the tape as it is affixed to prevent it from separating. Also be careful to make sure that the tape does not extend into the joint area.

4 Primer application

Since the primer is a liquid, uniformly apply it with a brush or a sprayer and let it dry for approximately 1 hour.

5 Filling

Cut the nozzle to the desired size at a 45° angle. Puncture the base of the nozzle inner seal and then insert the cartridge into the caulking gun.

6 Tooling

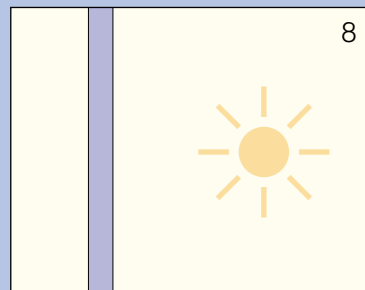
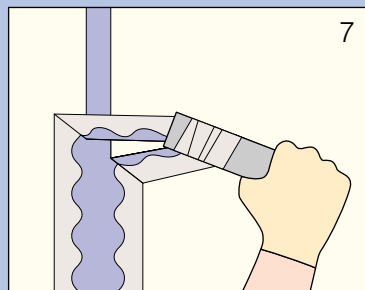
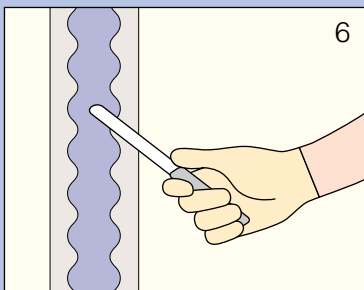
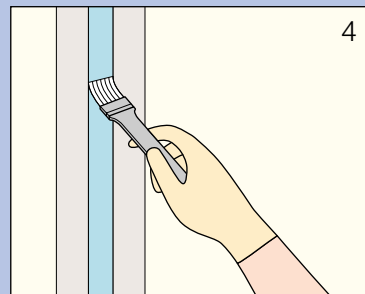
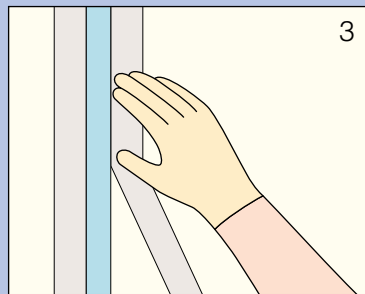
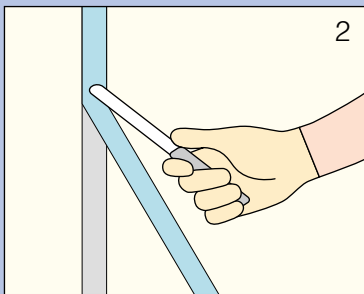
Tooling must be done after filling the joints with sealant. This step ensures a clean finish by hermetically sealing the sealant to the joint surface and preventing surface irregularities. The push-up method is ideal for tooling because it also removes bubbles in the sealant.

7 Removal of masking tape

Once you have completed the tooling step, the masking tape should be removed quickly while it is still possible. An efficient way to remove masking tape is to wind it around a large-diameter bar-shaped object.

8 Curing

Once the above steps have been completed, the joint surfaces must be carefully cured until they have completely hardened.



PROJECT REFERENCES



Kukje Building (Korea)

Shin-Etsu silicone sealants are made out of sealant materials that possess superior durability, weather resistance and adhesiveness. These sealants will show almost no signs of deterioration even when exposed to ultraviolet rays or ozone. These high performance sealants are also able to adapt to the movement of buildings caused by earthquakes or typhoons. It is precisely these characteristics that made contractors around the world choose Shin-Etsu sealants for use in a host of large constructions projects. Shin-Etsu sealants have helped make buildings which embody the best in design, composition and strength a reality.



都會大亨 (Taiwan)



太府天王星大樓 (Taiwan)



Hong Kong International Airport (Hong Kong)



Peak Trum Building (Hong Kong)



National Museum of Emerging Science and Innovation (Japan)



from left: Tamara Center/Lippo Plaza/BCD Tower/Bank Bali (Indonesia)



Tokyo Metropolitan City Hall (Japan)



Menara Imperium, Jakarta (Indonesia)



Seagate (Singapore)

TRANSPORT PRECAUTIONS

The use of a primer is necessary to improve durable adhesiveness of silicone sealants and to enhance building construction levels. Regulations have been set down that cover shipping when these primers are transported by air or sea because they contain solvent and fall under the definition of dangerous goods as set down by the United Nations.



Primer dangerous goods packaging

Grade (UN No.)	Packaging	By sea	
		# of packages	Package type
PRIMER-C (UN-1133)	100 g	4	Dangerous goods in limited quantities packaging small
	100 g	40	Dangerous goods in limited quantities packaging large
	250 g	8	Dangerous goods in limited quantities packaging large
	250 g	60	Dangerous goods in limited quantities packaging large
	1 kg	4	UN dangerous goods packaging
	1 kg	10	UN dangerous goods packaging
	1 kg	20	UN dangerous goods packaging
	Over 1 kg	Not set	
PRIMER-AQ-1 (UN-1866)	100 g	Not set	
	250 g	8	Dangerous goods in limited quantities packaging small
	250 g	60	Dangerous goods in limited quantities packaging large
	1 kg	4	UN dangerous goods packaging
	1 kg	10	UN dangerous goods packaging
	1 kg	20	UN dangerous goods packaging
	18 kg	1	20L UN minidrum
PRIMER-T (UN-1866)	100 g	10	Dangerous goods in limited quantities packaging small
	100 g	80	Dangerous goods in limited quantities packaging large
	1 kg	4	UN dangerous goods packaging
	1 kg	10	UN dangerous goods packaging
	1 kg	20	UN dangerous goods packaging
	Over 1 kg	Not set	
PRIMER-MT (UN-1866)	100 g	10	Dangerous goods in limited quantities packaging small
	100 g	80	Dangerous goods in limited quantities packaging large
	1 kg	4	UN dangerous goods packaging
	1 kg	10	UN dangerous goods packaging
	1 kg	2	UN dangerous goods packaging
	16 kg	2	UN dangerous goods packaging
PRIMER-D2 (UN-1133)	100 g	10	Dangerous goods in limited quantities packaging small
	100 g	80	Dangerous goods in limited quantities packaging large
	1 kg	4	UN dangerous goods packaging
	1 kg	10	UN dangerous goods packaging
	1 kg	20	UN dangerous goods packaging
	Over 1 kg	Not set	

HANDLING PRECAUTIONS

Storage and Usage

1. Work should not be carried out in cold or humid conditions because low temperatures and high humidity can result in problems such as insufficient hardening or defective adhesion.
2. Sealant N and Sealant 456 start curing upon exposure with moisture in the air when being extruded from the cartridge. As a result, curing speed will differ depending on the temperature and humidity.
3. Products should be used immediately after opening. If, however, the entire contents of a cartridge cannot be completely used immediately after opening, then the cartridge should be tightly sealed.
4. Keep products out of direct sunlight and store in a cool (5°C to 25°C) and dry place.
5. When curing takes place in a poorly ventilated area, copper corrosion may occur. In such cases, we recommend that Sealant 72 be used or that you contact Shin-Etsu for advice prior to selecting a sealant.
6. Clean tools immediately after the completion of work.
7. Joints may become soiled as a result of rain when silicone sealant is used on materials such as stone, tile, vitreous surfaces or painted panels of external walls.
8. Paint will not adhere to joint surfaces.
9. Caulking guns with a pressure of less than 0.3 MPa (3 kgf/cm²) should be used.
10. Do not use the products for SSG system.



Safety Guidelines

1. Make sure that the work area is well ventilated.
2. Uncured sealant will irritate skin and mucous membranes, and it should not be allowed to come into contact with the skin or eyes. However, in the event that the sealant does come into contact with the eyes, the affected area should be immediately flushed with a large volume of water for at least 15 minutes and then that individual should immediately seek medical attention. If the sealant comes into contact with skin, the affected area should be wiped immediately with a dry cloth and then washed thoroughly with soap and water.
3. Remember to never touch your eyes while working with sealant. It is recommended that goggles be used.
4. Those individuals who wear contact lens should make sure that the lens do not come into contact with uncured sealant. In the event that uncured sealant does come into contact with contact lens, the sealant will probably permanently adhere to the lens.
5. Keep sealant out of the reach of children.
6. Sealant-N, Sealant-456, Sealant-4588, Pure-Sealant and Sealant-40 generate methylethylketoxime (MEKO) during the curing process, and thus you should make sure that your work area is adequately ventilated, both while you are working and for 24 hours after the work has been completed. If you start to feel dizzy, leave the area immediately to get some fresh air.
7. Please read the Material Safety Data Sheet (MSDS) before use. MSDS can be obtained from our Sales Department.

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