

Low Out-gassing Sealant for Cleanrooms

~ Effectively Serving as Powerful Measure against Chemical Pollution in Next-Generation Cleanrooms



1-Component Modified Silicon Sealant

PENGUIN CLEAN SEAL

2555 **Eco-Cart**

SUNSTAR ENGINEERING, INC.



PENGUIN CLEAN SEAL 2555 Eco-Cart

Provides a measure against “Chemical Pollution” at production facilities of electronic devices such as semiconductors and flat displays

Generates no siloxane, phthalic acid ester or other chemicals

Low out-gassing sealant for cleanrooms

PENGUIN CLEAN SEAL 2555

“PENGUIN CLEAN SEAL” is a registered trademark.

Uses

Joint sealing at cleanrooms for production/processing of electronic devices such as semiconductors and flat displays and laboratories and at research facilities for evaluation of outgassing

- Joint sealing of interior panels
- Joint sealing around openings
- Joint sealing around air-filters, penetrating pipe, and pipe joints
- Sealing around fixture units of equipment

Features

Low outgassing

It generates no cyclic siloxane or generates, if any, an extremely small quantity of other organic gases.

It contains no DOP, DBP and other phthalic acid plasticizers or solvents.

It uses none of 13 volatile organic compounds (VOCs) that can cause sick-house syndrome as specified in “Guidelines for Indoor Air Pollution - Guideline values for indoor concentration” by the Ministry of Health, Labor and Welfare.

Excellent non-self-contamination characteristics

Once cured, it gets almost non-sticky. This will keep the beautiful surfaces from being easily contaminated and spoiled after application.

Self-contamination: Adhesion of dust and other contaminants on the sealant surfaces due to stickiness of the sealant itself.

Penguin Clean Seal
2555

Penguin Seal
2505

(General-purpose 1-component silicon)



The sealants were applied at 20°C or lower. At a specified time interval, volcanic ash was sprinkled over the sealants, swept off with a brush, and the surfaces of the sealants were inspected for contamination.

Excellent adherability without primers

It provides excellent adherability on most interior materials for cleanrooms.

Excellent workability at low temperatures

Its low temperature-dependency provides stable extrusion characteristics in a wide range of temperatures.

Especially at low temperatures, its smooth extrusion capability will remarkably improve workability.

Adoption of environmentally-friendly “ECO-CART” container as dust-control and environmental measures in cleanrooms.

The “ECO-CART” generates no dust, reducing 85% of waste as compared to a paper-core cartridge.



A registered product of “F☆☆☆☆” conforming to the Voluntary Regulating Rule by Japan Adhesive Industry Association(JAIA registration number: 006589)

Organic Outgassing Characteristics Dynamic Headspace Engineering Test Method

Organic outgassing sampling is conducted according to the "Dynamic Headspace Engineering Test Method" as specified in the "Guideline for Evaluation of Airborne Molecular Contaminants Emitted from Construction / Composition Materials for Cleanroom" (Japan Air Cleaning Association, (JACA)).

<Conditions of Sample Curing>

A stainless steel frame having one open plane (with the bottom raised by 10 mm using a stainless steel plate) is filled with the sample. After application of the sample sealant, the frame is left exposed for 2 days in a room at a constant temperature and a humidity of 20°C and 60%, respectively. Then the test sample is wrapped in aluminum foil and cured for 26 days in the same condition. (The measurement was conducted at the material age of four weeks)

< Conditions of Sampling >

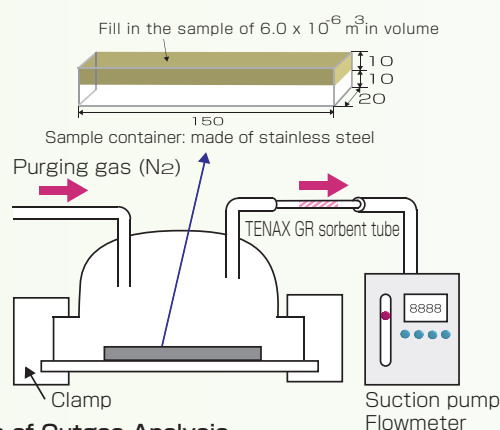
The sample is placed in a micro-chamber of quartz cell (Of 0.9L in capacity) and the outgas is collected in the Tenax sorbent tube while Nitrogen purging conducted.

● Purging gas flow rate : 0.5L/min

● Temperature / Humidity inside the chamber: 23°C, 45%

< Conditions of Analysis >

Outgas analysis is conducted using TRANSDUCER-GC/MS (Thermal Desorption - Gas Chromatograph/Mass Spectroscopy) and quantified through toluene conversion.



Results of Outgas Analysis

Organic outgas		Penguin Clean Seal 2555	Penguin Seal 2505
Phthalic acid plasticizer	DBP	ND	ND
	DOP	ND	ND
Low- molecular-weight cyclic siloxane	D3	ND	2600
	D4	ND	>180,000
	D5	ND	>75,000
	D6	ND	>21,000
	D7	ND	120
	D8	ND	84
	D9	ND	ND
Antioxidant	BHT	ND	ND
	DOA	ND	ND
Amount of total organic compounds emitted		3,800	1,600,000

Unit: $\mu\text{g}/\text{m}^3/\text{h}$

ND: Not detectable

*Penguin Seal 2505: A general-purpose 1-component silicon sealant of deoximation type
*The results of outgas analysis are obtained in the conditions, including sampling, described above. The outgas characteristics may change in other conditions.

Properties/Performances

Item		Penguin Clean Seal 2555
Main component		Modified silicon
Specific gravity		1.49
Loss of quantity by heating (%)		0.8
Viscosity ($10^4 \text{ mPa}\cdot\text{S}$)	5°C	36.4
	20°C	26.5
Slump (vertical) (mm)	20°C	0
Tuck-free	5°C	7-12 hours
	20°C	80 minutes
	40°C	30 minutes
Hardness (JIS A)	20°C	26
Non-self-contamination characteristics after curing		20°C 1 day
Rubber physical properties	M ₅₀ (N/mm ²)	0.2
	T _b (N/mm ²)	0.8
	E _b (%)	200
Curing characteristics at inside (Thickness after 1-day curing)		5°C, 10% RH 1.2
		20°C, 65% RH 2.3
		35°C, 90% RH 6.9
Classification by durability		8020
Shelf life	Storage in a cool dark place	12 months

* The values shown in the table are typical values.(They are not specification values.)

Adherability

Substrate	Penguin Clean Seal 2555		Penguin Seal 2505	
	After curing	After water immersion	After curing	After water immersion
Antistatic paint- coated steel sheet	△	△	△	△
Antistatic vinyl cloth	○	○	○	○
Antistatic 2-liquid epoxy floor material	○	○	○	○
Aluminum treated by secondary electrolytic coloring	○	○	○	△
Aluminum electropainted with acrylic gloss clear paint	○	○	○	○
Rigid PVC pipe	○	○	○	○

* JASS 8 (Simplified adherability test) Without primers

* After curing: at 20°C for 7 days + at 35°C and 90%RH for 7 days

* After water immersion: after curing + water of 20°C for seven days

* [Evaluation criteria] ○:Good adherability

△:Good adherability obtained with buffing or application of the specific primer

×:Poor adherability

*[Reference data] Penguin Seal2505 (General-purpose 1-component silicon sealant)

Directions for Use

- 1) Remove moisture, oil, dust, rust and other contaminants from the joint or the joining surfaces and let them dry.
- 2) Place masking tapes to mask off the areas that should not be contaminated.
- 3) Follow the steps as shown in the diagrams (Fig.1-Fig.6) to attach the ECOCART to the cartridge gun.
- 4) Extrude an adequate quantity of the sealant to fill in the joint or the joining surfaces.
- 5) Flatten out to finish the sealant with a metal spatula or a packer
- 6) Having finished it up, remove the masking tape immediately.



Fig.1 Remove the moisture-proof film of the ECOCART.



Fig.2 Attach the nozzle to the ECOCART.

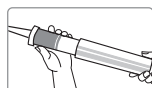


Fig.3 Insert the ECOCART into the holder.

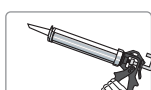


Fig.4 Attach the ECOCART that has been inserted in the holder to the caulking gun.

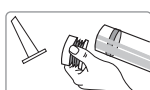


Fig.5 After application is completed, remove the empty cartridge from the holder.



Fig.6 A new ECOCART can be inserted from the opposite end of the holder.

Packing/ Color

Volume	Quantity	Standard color (4 colors)
ECOCARTTRIDGE of 320 ml	A box containing 10 cartridges x 2 / case	White, gray, light gray, and ivory

- Penguin Clean Seal 2555 is produced to order. Contact us for details.

* Application of the sealant requires a specific ECOCART holder (optionally available). This specific holder enables application of the sealant with a general-purpose cartridge gun (optionally available).



Notes:

The information and data contained in this catalogue are based on results of the tests we carefully conducted. However, the performances and the properties of the product may differ according to materials and application conditions. Carefully consider and check the above before use. The product descriptions contained in this catalogue are subject to change without notice.

Precautions for Use

- The sealant is not applicable to glass materials exposed to direct sunlight or ultraviolet light.
- In damp and wet conditions, the sealant can swell and can be poor in adherability. Check that the substrates are completely dry prior to application.
- The sealant hardens quickly. Apply the sealant as quickly as possible in high temperature and humidity conditions.
- Adherability of the sealant can vary depending on substrates.
 - * Check for adherability beforehand when application of the sealant is planned on difficult-to-adhere materials including antistatic paint-coated steel sheets, fluoropolymer paint-coated steel sheets, and fluoropolymer paint-coated aluminum. Apply the primer US-1 as necessary.
- Although the sealant basically provides excellent adherability without primers, some substrates may require primers. For selection and use of primers, consult the architect/designer beforehand.
- When application of the sealant is planned for maintenance and repair of the existing sealant, check for adherability to the existing sealant, or contact us. Avoid application to existing silicon sealants, in particular, because adhesion is hopeless.
- Make sure the working area is well ventilated, especially when it is closed.
- Wash your hands thoroughly after application of the sealant.
- After application, the white color may turn yellow with time.
- Store the sealant in a dark and cold place (between 5°C and 25°C) while avoiding direct sun, fire, moisture, or water.
- Use the sealant within the shelf life (within 12 months after the manufacturing date).
- For disposal of ECOCART waste, let the content to harden and have a licensed industrial waste disposal contractor handle it.
- For more detailed information, refer to the Material Safety Data Sheet (MSDS).

<First-Aid Treatment>

- In case the sealant accidentally comes in contact with your skin, immediately remove it with a piece of cloth. Then thoroughly wash the skin with plenty of soap and water. If irritation or inflammation occurs, immediately consult a doctor.
- In case the sealant gets into your eyes, rinse them thoroughly with clean water for at least 15 minutes and immediately consult an eye doctor.
- In case you inhale a lot of vapor of the sealant, move to a fresh-air area, rest while keeping yourself warm. Then immediately consult a doctor.
- In case you ingest the sealant, rinse your mouth with water (and induce vomiting if possible.) Then immediately consult a doctor.
- In case the sealant is splashed onto your clothes, try to remove it with a piece of cloth and wash it away with water. Since it will be very difficult to remove it completely, be careful not to splash it.

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