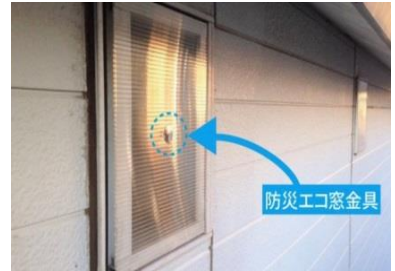
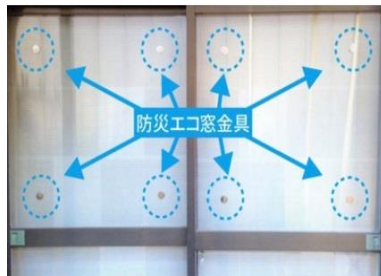


Disaster Prevention Eco-windows General Catalog

For typhoon, crime, energy loss and noise control!

Synergistic effect of eco-friendly window attachments for disaster prevention + hollow polycarbonate



NPO ESCOT for Renewable Energy & Environmental Technologies development

Zip code 277-0011 4-17 Azumakami-cho, Kashiwa-city Chiba-pref.

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<https://npo-escot.org>

Production support ⇒ +81-80-4365-0861

Protects window glass from physical impact from the outside.

At the same time, the high thermal insulation performance reduces energy loss through windows by approximately 50%.

< Winner of the Monozukuri Idea Grand Prize
Reason: Low initial investment and high effectiveness
can be expected.

< Received the "Eco-Company Award"
Eco-evaluation of the Escott office that was installed

< Kashiwa City Hometown Tax Returns >
Registration

< Patent rights acquired
Novelty and uniqueness evaluation

Installation is DIY-able and requires no special tools.

Polycarbonate is a high-strength, long-lasting, and flame-retardant material used in bulletproof glass, aircraft, and bullet train windows.

Hollow polycarbonate applied to the exterior surface of the glass protects the window from all physical impacts, including typhoons, hail, and wind gust crimes.

It also has high heat insulation performance, reducing the amount of heat going in and out of the window by about half, resulting in energy savings of about 30%.

In addition, the hollow polycarbonate provides a noise reduction effect of 16db, reducing noise stress for residents living near major roads, airports, and other noise sources.

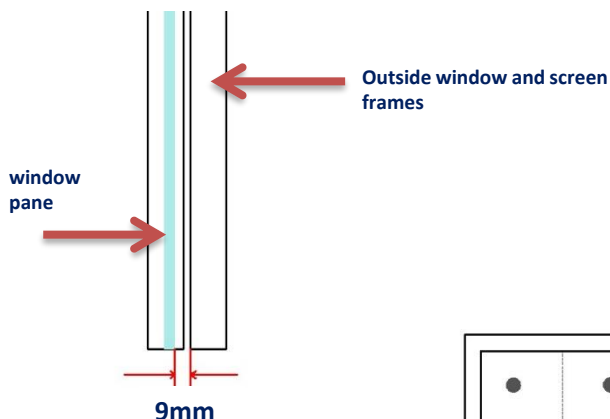
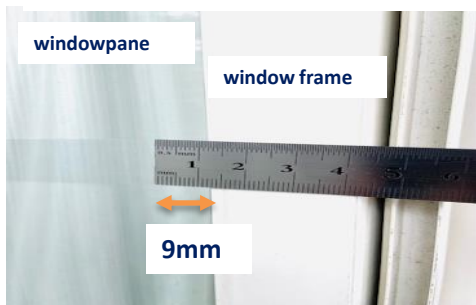
Hollow polycarbonate boards (182 cm x 91 cm, 4 mm thick) can be purchased for around 2,000 yen at local home centers, etc., and can be cut to window size with a cutter knife.

Easy to remove after installation and easy to clean.

Instructions on how to remove the base plate for relocation, etc. are included in the instruction manual.

DIY Installation

Sliding windows: The gap between the window glass and window frame must be at least 9 mm.



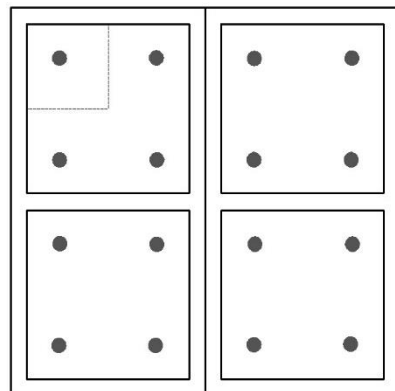
Components of eco-friendly windows for disaster prevention



+



⇒

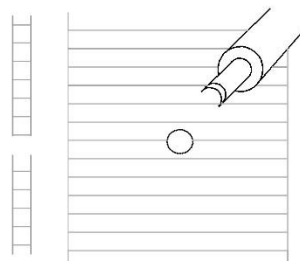


Hollow polycarbonate 4mm thick

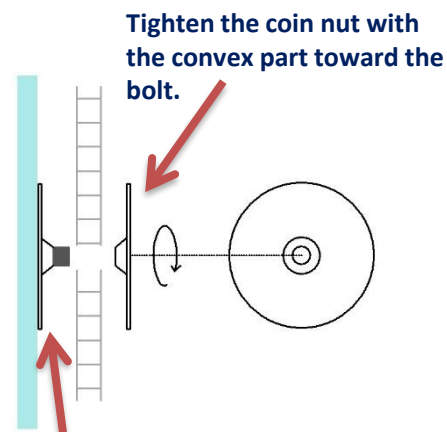
set
Base plate with bolt
coin nut Outer diameter: 30 mm,
Thickness: 0.8 mm
Bolt: Thickness=4mm, Length=8mm

Windows can be reinforced double-layered from the outside.
Aim for one set per 50cmx50cm.

Disaster prevention eco window installation



Drill a hole about 1 cm in diameter in hollow polycarbonate.
Use a round carving knife or solder when the holes overlap with the ribs.
Holes can be neither too large nor too snooty in shape.



Base plate with bolt



Silicone on this surface. and affix it to the glass.

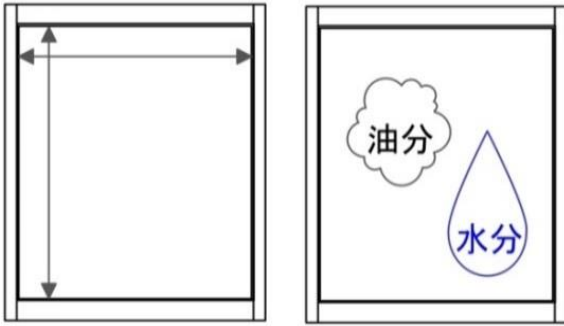


Thread the convex part of the coin nut through the bolt.
Fix hollow polycarbonate.

2023/10/19

Mounting on window

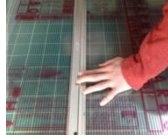
Step-1. Clean the window glass and measure its length and width. Cut the hollow polycarbonate sheet with a cutter.



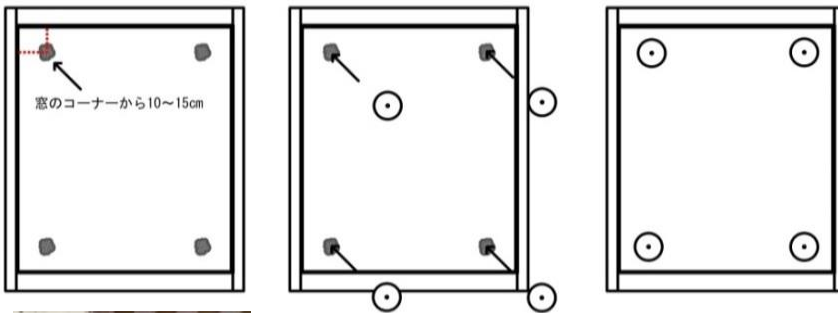
- (1) Remove oil film and moisture thoroughly with alcohol, etc.
- (ii) The size of the window glass is measured from the inside of the packing. Cut the hollow polycarbonate so that the elongated space is horizontal.

*Vertical use is also possible depending on the window shape.

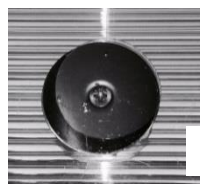
Caution: Wear gloves, etc., and work without injury.



Step-2. Apply silicone to a window bolt with a pre-set bolt about 10 cm to 15 cm from the corner of the glass surface. The position of metal fittings can be changed depending on the shape of the window. Depending on the size, it may stop at two places or one place.



Recommended silicone:
KONISHI CORPORATION Bath Bond
Q Part No.: #04888



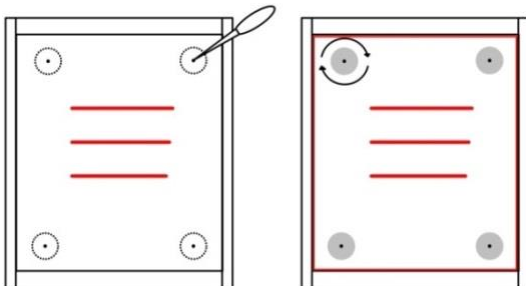
Viewed from the inside

Positioned by pattern paper or other means, the base plate with the bolts set is stretched over the window glass.

*Slight misalignment can be adjusted with the hole on the hollow polycarbonate plate.

Wait one day for the window bolts to dry after

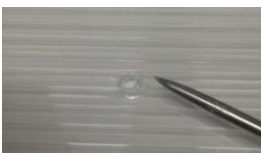
Step-3. Drill a hole in the pre-cut hollow polycarbonate board with a nail or similar tool, thread it through the window bolt, and secure it with a coin nut.



- (1) Fix one position at a time while checking the position.

*If the ribs (support surface) of the hollow polycarbonate plate are in the way Cut off and widen the ribs with a carving knife (round) or similar tool. (The larger the hole, the better.)

- (2) Turn the coin nut clockwise as if rubbing it with the belly of your finger.



Done.
Thank you for your hard work!

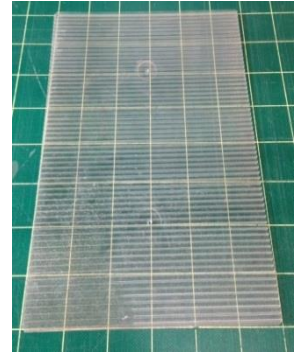


Cleaning and removal methods

Easily detachable depending on the season, typhoon, or other weather conditions!

Remove dirt from the gap between the window and the glass and wash the hollow polycarbonate.

- (1) Turn the coin nut and remove the hollow polycarbonate plate.
- (2) Wash the front and back of the hollow polycarbonate.
- (iii) Rinse the cavity with a strong stream of water.
- (4) After that, let it dry and then fit it back in.

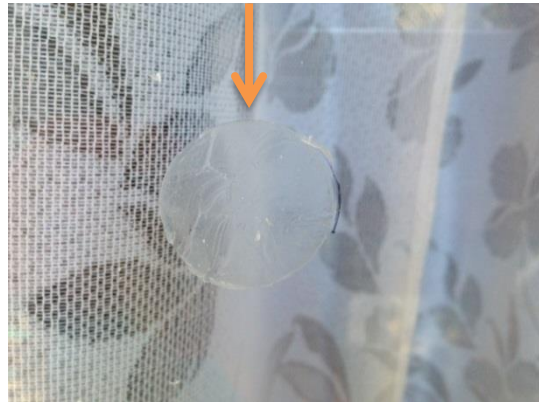


When you want to refurbish the hardware for disaster-resistant eco-friendly windows due to moving or other reasons.

- (1) Remove the window bolt by inserting a spatula or similar tool between the bolt and the glass and rubbing it.



- (2) Silicone remains as an adhesive.



Remove the silicone with a scraper, etc.



- (4) Wipe with a dry cloth and you are done.



feature	Explanation
flame resistance	Unlike acrylic and other materials, polycarbonate is difficult to flame and burn.
Outer (or both sides) insulation	It can be retrofitted to existing building windows for multilayered reinforcement.
selective lighting	It shades the room in summer and lets in sunlight in winter to brighten and arm the room.
Crime Prevention and Disaster Prevention	Hollow polycarbonate glass changes the conventional wisdom that glass is breakable.
soundproofing	<p>Sound reduction effect of approx. 16db.</p> <p>Sound reduction effect of a house facing a main road about 40 meters away.</p> <p>Noise reduction by aircraft, etc.</p>
Air Layer Adjustment	The length of the bolt can be freely selected to adjust the air layer.
Reflection angle adjustment	<p>The sunlight reflection angle can be changed by adjusting the top, bottom, left and right bolts.</p> <p>Overhangs are also possible by making the upper bolts longer than the lower ones.</p>
long life	The UV-cut roofing material has almost the same longevity as the building.
high strength	It is the same material as aircraft, bullet train windows, and bulletproof glass.
lightweight	<p>It is lightweight at 1 kg/m² and will not damage window rails.</p> <p>Also, the risk of injury from falling is extremely low.</p> <p>It was also adopted by many condominiums.</p>
ultraviolet light cutting	<p>It cuts ultraviolet rays so that indoor furniture and floors will not be damaged.</p> <p>Adopted for carton burn prevention in warehouses.</p>
freedom to dismantle	<p>Easy to remove and replace by turning the nut, and can be cleaned or replaced freely.</p> <p>Security measures are available. Please contact us.</p>

How to strengthen glass windows a must

Window cracking problem that cannot be prevented with tape



Shatter is weak in the wind:
 In Chiba, shutters were blown off.
 According to our research, wind-resistant shutters for typhoon areas from major manufacturers are limited to wind speeds of 44 meters (1200 pascal).
 On the other hand, the wind resistance of window glass in the Kanto region is about 48 meters.
 In other words, it is resistant to impact from collision of objects, but not to wind pressure.
 This means that it is weaker than window glass.

Estimation of impact force ($f=mv/\Delta t$)

This is the impact force calculation when an 80g steel ball is dropped from a height of 10m.
 It exceeds the window breakage limit of 1490N without a panel.

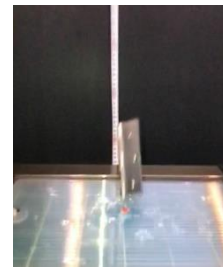
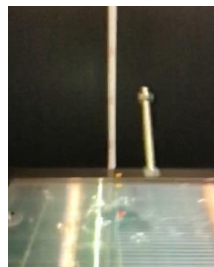
Panel + STS shock-absorbing ring: 106 N

mass	m	0.08 kg
Movement speed	v	10 m/s
braking distance	L	0.001 m
Impact force	f	1600.00 N
		163.27 Kgf Weight



mass	m	0.08 kg
Movement speed	v	10 m/s
braking distance	L	0.015 m
Impact force	f	106.67 N
		10.88 Kgf Weight

Drop test with various shapes of bump
 Spheres, bolts, hinges



Deformation characteristics of hollow polycarbonete due to fine protrusions
 It does not break like acrylic, but deforms itself to hold small pieces.

Estimation for high winds

The risk assessment of falling or dropping of the disaster-resistant eco-friendly windows was performed by wind pressure calculation.

Prerequisite:

■ Wind speed 50m/s

Wind direction is assumed to be parallel to the glass surface from horizontal and vertical directions.

Calculated based on a space of 10 mm between the window and the panel thickness of 5 mm (actually 4 mm is used), for a total of 15 mm.

Coefficients for concave wind-receiving surfaces are used for the ■ drag coefficients.

■ Using air density at an atmospheric pressure of 1000 hPa and an air temperature of 20° C

(1) Wind force from lateral direction

Drag L

Lift force D

Drag coefficient C_p 2.3 Use coefficient of concavity

Lift coefficient C_L 0

Air density ρ (kg/m³) 1.19 1000hPa, 20° C

Projected area of object relative to flow A (m²) 0.013

Flow velocity m/s 50

Drag force formula $L=1/2C_p\rho AU^2$ 4.54 kg·m/s²

Lifting force formula $D=1/2C_L\rho AU^2$ 0.00 kg·m/s²

Total 4.54 kg·m/s²

(2) Wind force from upward direction

Drag L

Lift force D

Drag coefficient C_p 2.3 Use coefficient of concavity

Lift coefficient C_L 0

Air density ρ (kg/m³) 1.19 1000hPa, 20° C

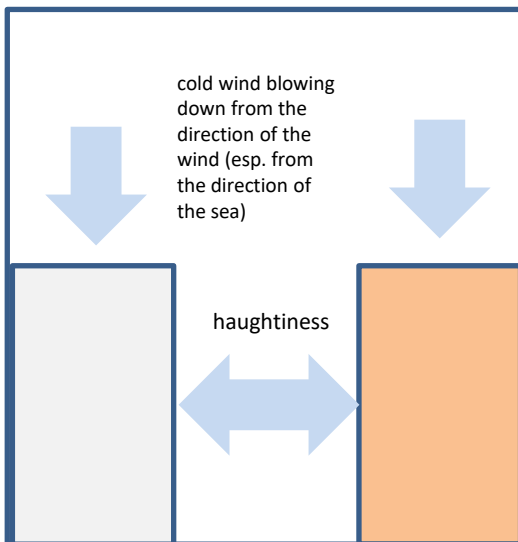
Projected area of object relative to flow A (m²) 0.008

Flow velocity m/s 50

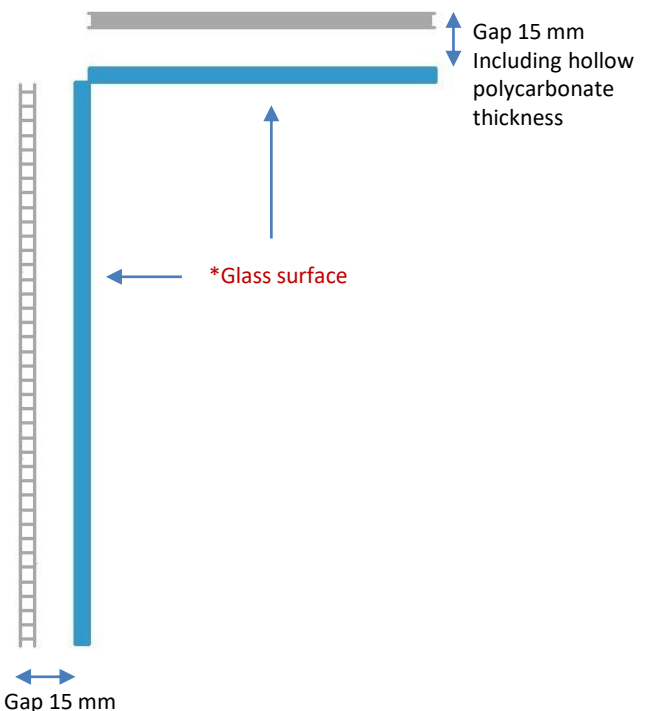
Drag force formula $L=1/2C_p\rho AU^2$ 2.93 kg·m/s²

Lifting force formula $D=1/2C_L\rho AU^2$ 0.00 kg·m/s²

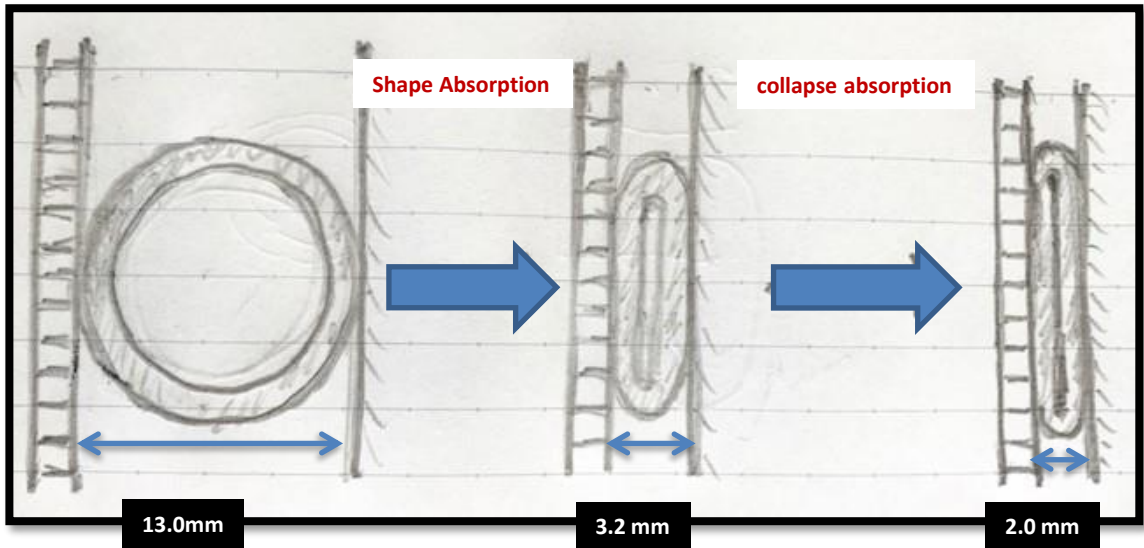
Total 2.93 kg·m/s²



*In fact, winds from directly beside and directly above
Not present in the structure of the building.

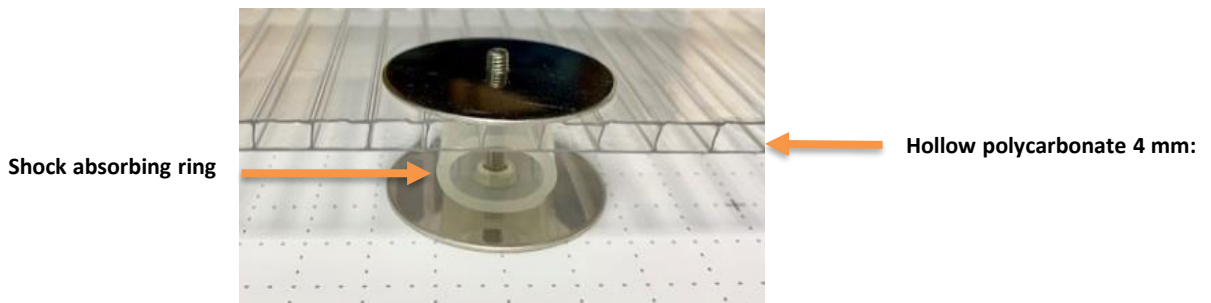


Absorbs changing wind pressure with its shape
Absorption of flying object collision by crushing



Prevents convection loss (i.e., energy loss due to air movement and heat transfer in a space)

*The space of approximately 12 mm between the window glass and hollow polycarbonate is the maximum value that brings out the most thermal insulation effect.



Window glass reinforced construction:

- (1) Deflection + crushing of 4 mm hollow polycarbonate plate
- (2) Absorption of wind pressure by deformation of silicone ring
- (3) Shock absorption by collapsing silicone material

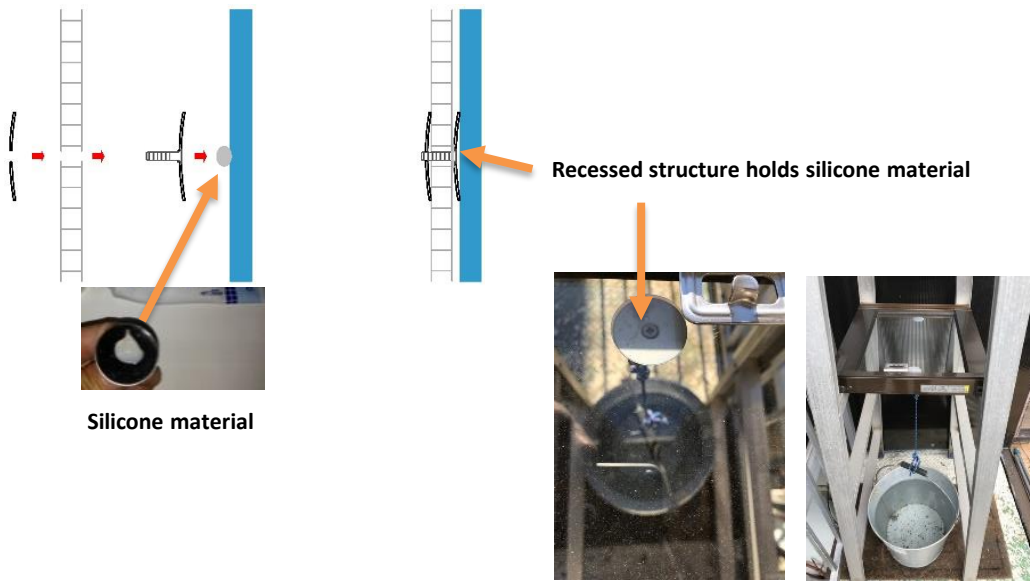
Caution:

A clearance of at least 20 mm from the window glass surface is required for installation. Therefore, it may not be used with sliding windows, etc.

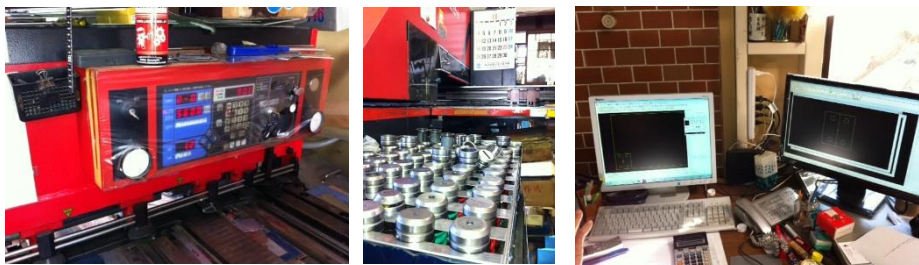


Optional price: 80 yen/set
Silicone ring
M3 20mm stainless steel bolt

Suction force test of suction cup shaped base bolt The only window glass exterior installation



Made in Japan quality: Precision machining by developing special jigs (domestic manufacturing plant)



Methodology that became patent rights



Adhesive strength and durability of silicone materials

We contacted the manufacturer of the silicone material used to bond the window glass to the window guard hardware.

January 25, 11:35 , Cemedine Adhesive Technology Consultation Center, Mr. Ito 0120-984-053
Questions about aging of silicone materials (oxime type)

Answer ⇒ Valid for about 10 years. Yellowing (yellowing) occurs due to ultraviolet rays, but there is no quality problem.
Please contact the sales office for experimental samples, etc.

January 30, 11:23, 03-6421-7276, Sales Department, Cemedine Co.
Questions about submitting test data on aging

Answer ⇒ They do not have test data. In the exchange of information with house builders, etc., they are saying that it is safe for 10 years.

*Independent strength tests were conducted.

We hung a bucket filled with 10 liters of water on a window bolt with silicone (oxime type) glued to the glass surface and watched its progress. The results of two experiments showed that the first could be retained for 2.5 days and the second for 7 days.

Left, overall situation; center, immediately after hanging; right, 24 hours later



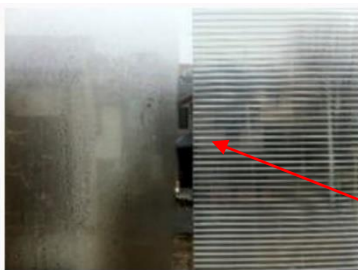
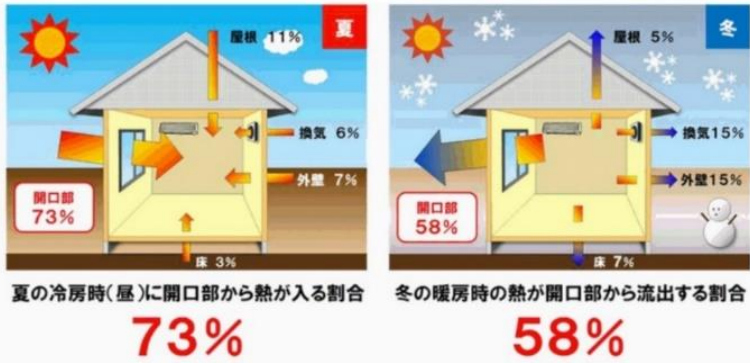
Safety wire

The following wire hooks were produced to prevent the panels from falling off when they were removed. Fixed with a window bolt in the lower corner of the panel and the other to the railing.



Energy loss and experimental values

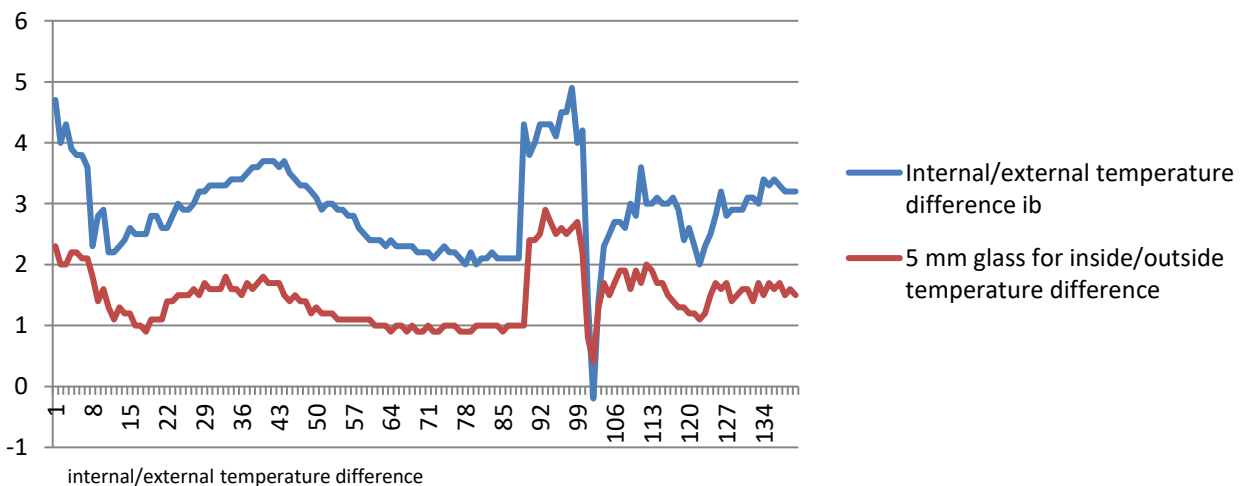
Energy loss from windows Image illustration (from Ministry of the Environment's external data)



Comparison of winter dew condensation conditions with hollow polycarbonate panel installation
 Photo above: NPO Escott Kashiwa Environmental Research Institute
 Photo below: NPO Escotto Oshukucho Kamifuse Test Center

Measured heat return coefficient (w/m2-k) of hollow window guard

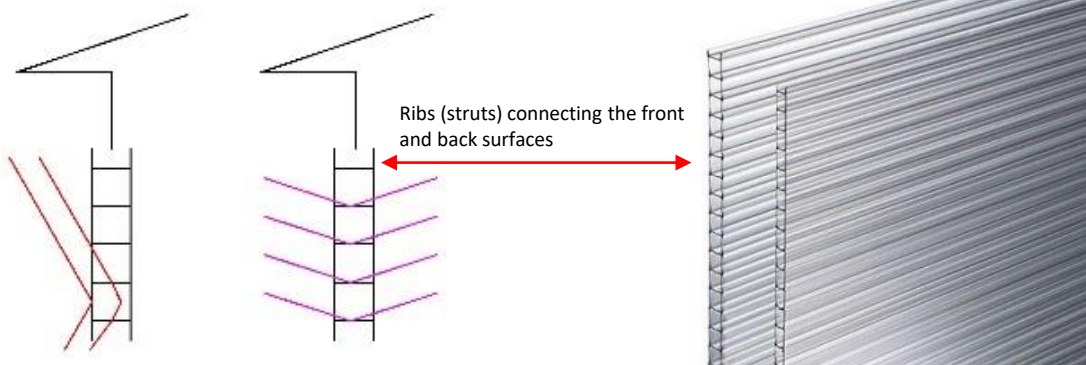
Comparison of temperature difference between outside and inside with and without window guards Measured on February 11, 2013
 The temperature inside the window with panels remained about twice as warm as the window without panels.



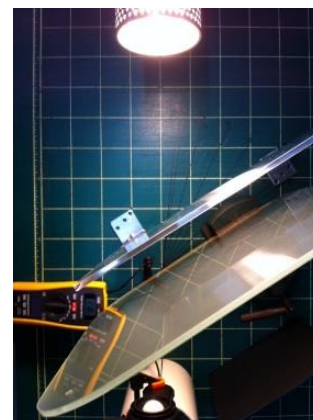
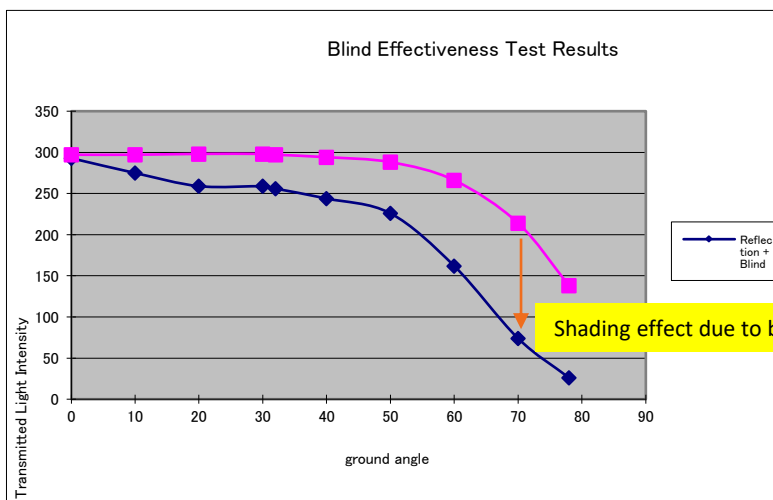
Smart lighting characteristics of hollow-harmonica structure

Shading in summer, lighting in winter

Blind effect illustration by placing hollow polycarbonate horizon



Light intensity (w/m²) attenuation test with hollow harmonica structure
 Light intensity measurement graph by angle of incidence



Comparison of winter lighting conditions by blind structure

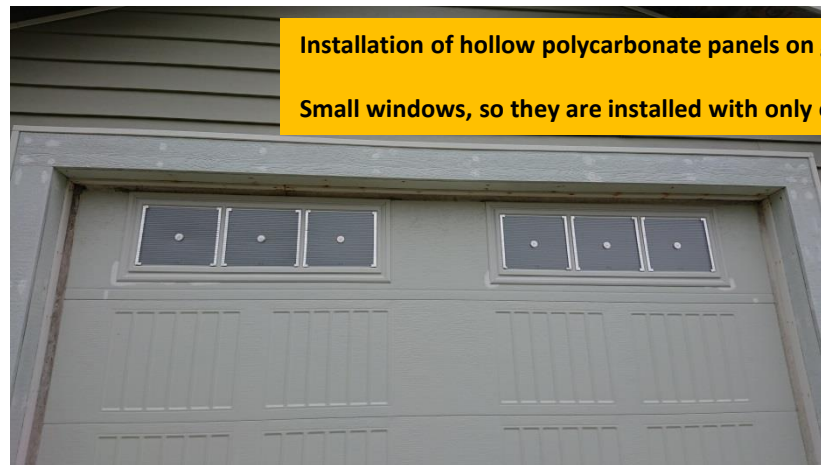
Left: Window glass only Right: Reflected light by hollow-harmonica structure



Examples of enforcement in various locations:



Residence of Mr. I in Chiba Prefecture
Tape reinforcement of garage windows



Installation of hollow polycarbonate panels on garage windows
Small windows, so they are installed with only one disaster-resistant eco-friendly window fitting.



Residence of Mr. E, Kanagawa, Japan
Bay window (upper left)
Push-out window (upper right in photo)
Fixed window above the entrance (bottom photo)

Residence of Mr. N, Fukuoka, Japan

Reinforced with tape in preparation for approaching typhoon



Purchase disaster-resistant eco-friendly window hardware

Hollow polycarbonate outside of tape reinforced window
DIY construction of 4mm



Residence of Mr. U in Shizuoka Prefecture

