

SILF[®]

Seiko Innovative Light Film
-Switchable Film

Maximum size
has increased to
1200mm×3000mm



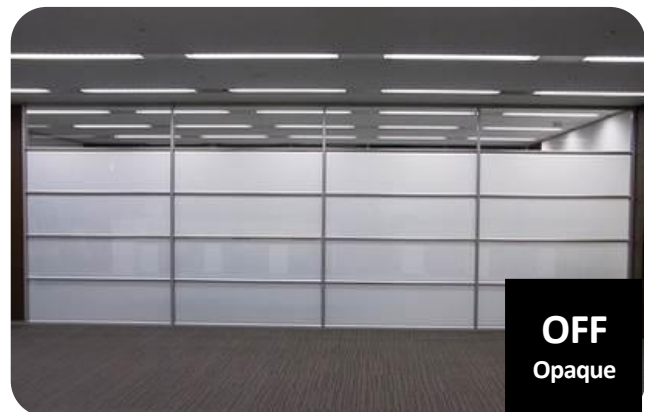
With the flick of a switch, it can transform between a transparent state and an opaque state instantaneously, thus protecting your privacy.



Seiko Electric CO., LTD.

What is Switchable Film (SILF)?

It is a film that can transform between a transparent state and an opaque state instantaneously with the flick of a switch (ON/OFF).



ON

OFF

With the flick of a switch **privacy is obtained instantly!**

Transparent

Opaque

ON
Transparent

Visible

- The transparent state gives you a wide open space.
- Show off your conference room, etc.
- Transforms any meeting, etc.

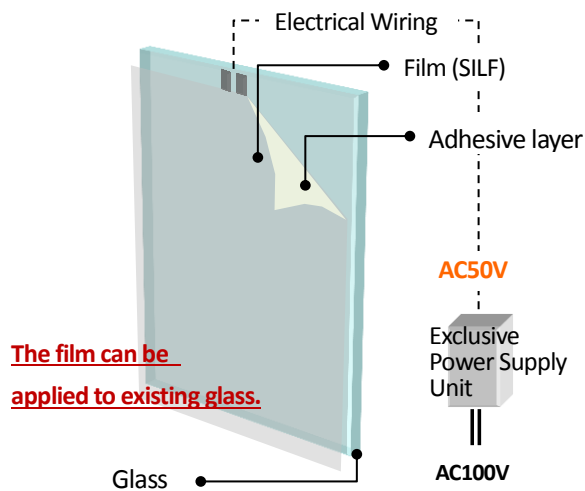
OFF
Opaque

Private

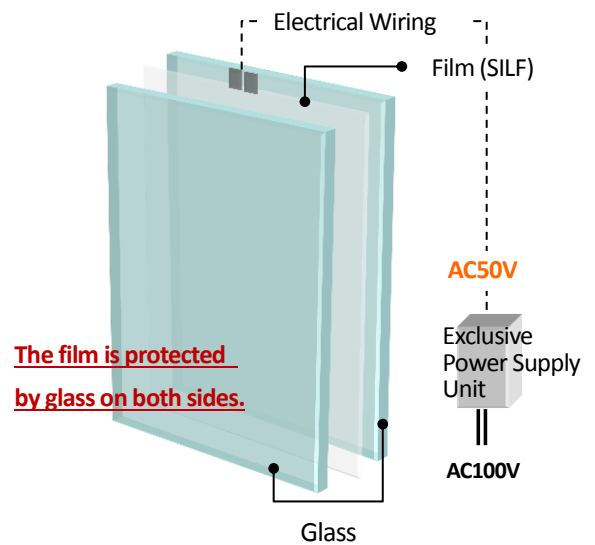
- When there is an important meeting or vital customers come, opaque state renders privacy.
- Available when you want to concentrate, protect privacy, or just need a discreet place.
- Blinds or curtains are no longer needed.

Categories of SILF

① Sticking type



② Glass type



Features of SILF

High Permeability

With the new research and development of our switchable film, **a higher permeability** has been reached when compared to our former product.

Transparency

Low-Voltage Drive

Rated voltage is AC50V.

It is extremely safe because the voltage is lower than 50V. Electricity fees are **one yen** per square meter per day (when kept on for eight hours).

Safety

Designed for 10 years

The products are designed for 10 years after being implemented.

Its reliability is proved by accelerated degradation test that is 10 years equivalent.

Relieved

Vision Improvement

Clarity through the newly developed switchable film has improved dramatically. **Transparency has been vastly improved when viewed from an angle.**

Good feeling

Made in Japan

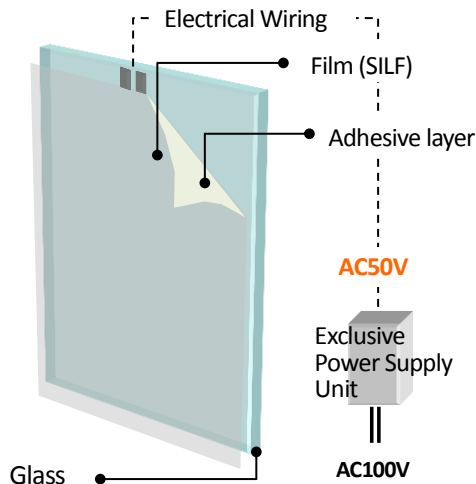
Our Seiko brand assures you of a safe design.

From manufacturing to the final quality check, it is all done in our clean room. Quality management and after service are also reliable.

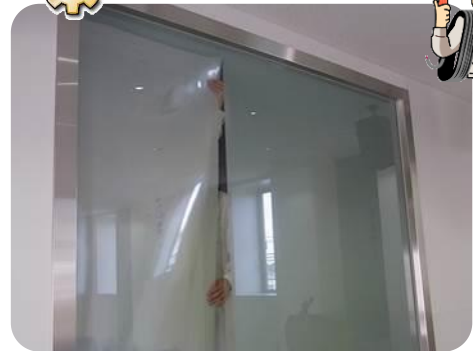
Made by Seiko

Application Example of SILF

POINT Stickable



Electrical wiring is necessary



1 Stick on

It is possible to install it by **sticking** it to the existing glass.

What about using it as **a replacement of blinds** or **decorative films**?

2 Possible to cut or hollow the film

Films are possible to **be cut and hollowed freely**.

3 Possible to apply to a curved surface

Possible to apply on cylinders with **a radius of more than 2000 mm**.

4 Improved strength

Even when the glass is broken, **the chance of the glass shattering is decreased**.

<Example of application to the existing glass at an office>



* Film is applied to the inner side of the existing glass

5 UV Cut-off Function

When opaque, SILF can cut off **96% of ultraviolet rays**.

6 Thermal insulation

When opaque, SILF can cut off **9% of infrared rays**.

7 Alleviates direct sunshine

When opaque, SILF scatters sunshine, therefore the light is softened.



Please leave the construction work to us

- Confirmation of the present condition
- Making an installation plan
- Quotation
- Installation

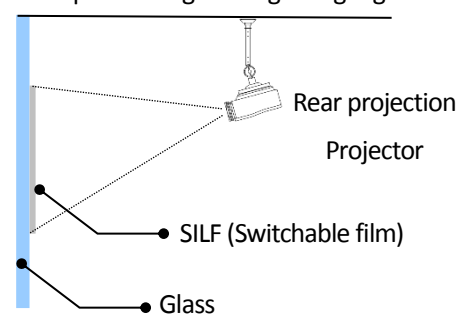


POINT 2 Image and effect of projection

Projected image clearly casts on switchable films applied on the glass or acrylic materials.



Example of using it as digital signage



1 Advertise your products utilizing a multi-tiered system

Create a dynamic presentation that reveals the real product after the sales pitch



Switchable film is applied to one side of the glass.



Project images or videos to display a crystal clear message.



When the presentation is concluded, simply flip the switch, and the diorama on the other side of the glass will show.

2 It is possible to apply the film on glass without making the space between them stand out

In the case of applying film to glass that is bigger than the largest size of SILF (1200 mm×3000 mm), it's possible to align multiple films with each other and minimize the effects of the gap by utilizing a special kind of caulking compound.

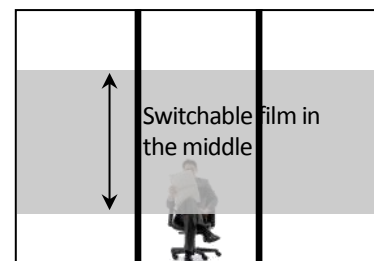
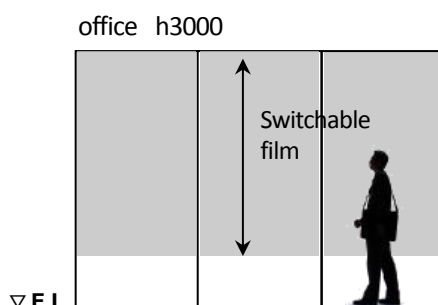


Office



Possible to install the film in part of laminated glass as well

How about installing film only on the necessary part of the glass?



* Vertical frames are necessary when the film is applied in the middle of the glass.

Concerning the safety of sticking type of SILF

Firstly,

When applying voltage to the film, there is a danger of getting an electric shock. However, the safety of the sticking type is guaranteed by the following two points:

- ① Low-voltage drive (50V)
- ② The exclusive power supply unit is equipped with the function of *¹earth-fault protection.

*¹Earth-fault: Generally speaking, it refers to a short circuit. There are risks of electric shock, etc.

① Concerning safety of 50V (contact condition and contact voltage)

When a person standing on the earth touches a live part and gets an electric shock, we call the voltage that applies to the human body as contact voltage.

Depending on various contact condition (including its possibility that it may occur), allowable contact voltage is different.

Diagram of contact condition and voltage reference value

Guide of protection from earth leakage in low voltage circuit by The Japan Electric Association

	Contact Condition	Objective electric circuit	Contact voltage
Type 1	• When most part of human body is inside the water	• Electrical circuits set near bath tube, swimming pool, or places where human have easy access to, such as water pool, pond, paddy, etc.	lower than 2.5V
Type 2	• When someone gets seriously wet • When someone touches electrical equipment or tools made by metal at all times.	• Electrical circuits in the places described in type 1 or tunnel construction site where humidity and vapor is seriously accumulated. • Electrical circuits where people have easy access to metal made electrical equipment, tools and buildings	lower than 25V
Type 3	Except for type 1 and type 2, there is a high possibility that the risk of electric voltage applies to someone at all times.	Electrical circuits that human beings have easy access to (for example, electric tools which may easily be touched by human beings, in such general places like houses, factories, offices, etc.)	<u>*² lower than 50V</u>
Type 4	• Under condition of type 3, it is only a little bit dangerous even if contact voltage applies. • When there is no access to contact voltage.	• Places where people have no access to (for example, electric tools set in high places or places hidden in the general places like houses, factories, offices, etc.)	No limit



*² lower than 50V

The guide of protection from earth leakage in low voltage circuit by The Japan Electric Association designates that under 50V is safe in a general environment.

50V voltage has been applied to telecommunication lines, and has long been used.

② Concerning the earth-fault protection (protection from an electric shock)

Degree of danger when getting an electric shock is decided by *³the current value that goes through the human body and the duration.

If large current goes through someone, it is very dangerous even within a short amount of time.

On the other hand, a small current is not that dangerous going through the human body for a long time.

It is said that the boundary is 20mA/s. (From The Japan Electric Association homepage)

*3 the current value that goes through the human body



POINT

The exclusive power supply unit is implemented with a very safe protective function that can detect an electric leakage of 1mA (minimum detective current), and disconnect connection within 0.5 second.

How can one feel about a current of 1mA?

minimum detective current just a slight pain no danger to people

(For reference)

From Kanto Electrical Safety Inspection Association homepage



5 mA
Significantly painful
start value of danger



10 mA
Pain that can not be
beared



20 mA
boundary of muscle
control



50 mA
Lose consciousness,
abnormality of heart
and respiratory system



100 mA
Symptoms of cardiopulmonary
arrest arise. Life is threatened

Standard Wiring Diagram

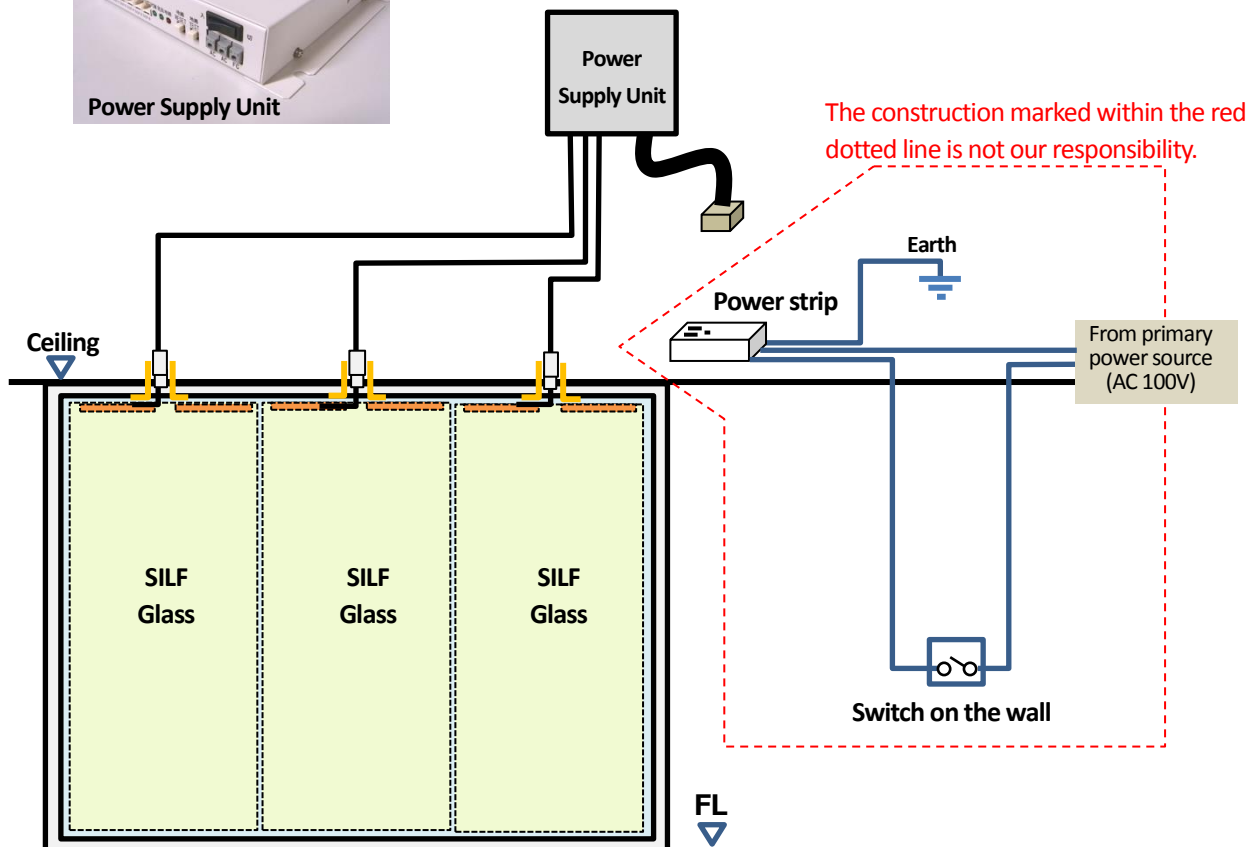


Power Supply Unit

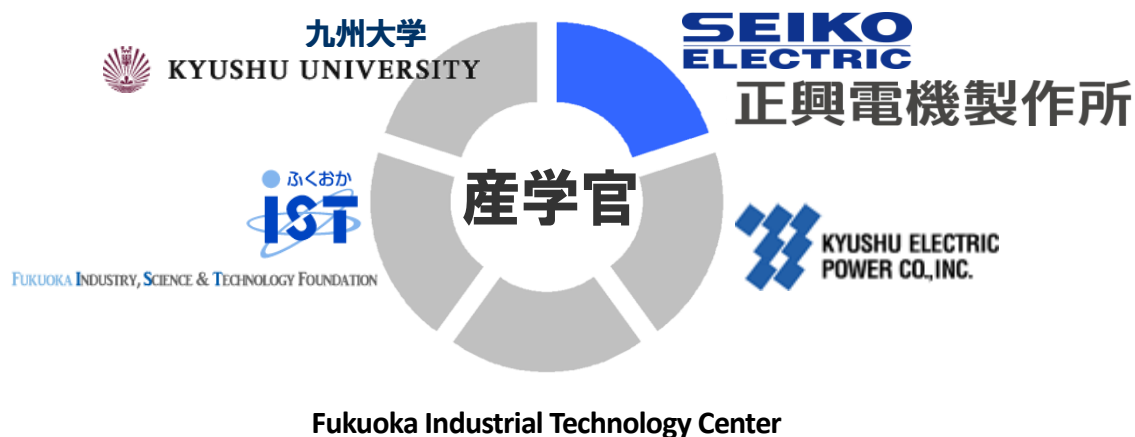
Size: W168mm×D150mm×H36mm

Weight: 800g

The unit can control six films at most with a total area dimension of up to 10m²



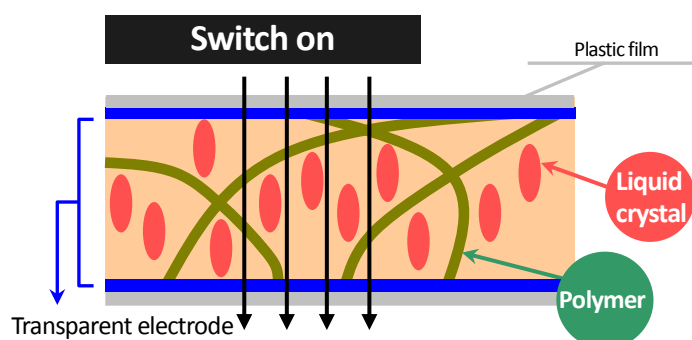
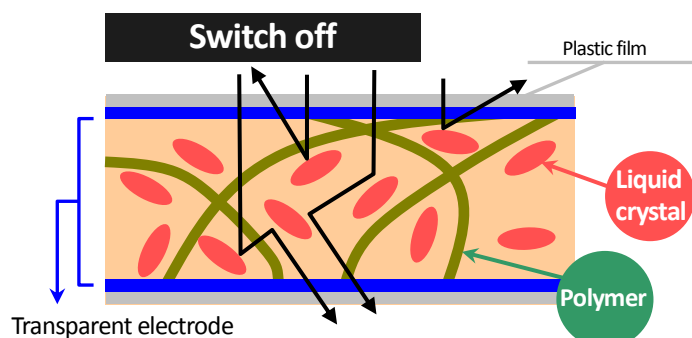
Developmental background of liquid crystal technology



From the year of 1997 to the year of 2002, research and development regarding polymer network liquid crystal (PNLC) had been conducted with industrial-academic-government cooperation.

※This product is developed by applying the research and technology of Kyushu University (former Kajiyama Research Laboratory)

Operation principles of SILF



-Delivery record of switchable film

Office Partitions

Daiichikigyo Corporation	Nikkei Publishing Inc.	Marubeni Mates Ltd.
Head office of SEGA TOYS	Shunan System Sangyo	Japan Concentrix KK
Tokyo branch of Minato Bank	JA Kyosai	Gifu Kato Manufacturing Corporation
Head office of System Create	TACHI-S	Nihon Cyuou Jyuhan
KYOCERA Communication Systems Co., Ltd.	NETZ TOYOTA AICHI	Anicom Insurance, Inc.
3hands Inc.	Nomura Research Institute	Head office of IBM
Ginza Stefany Inc.	Hitachi Systems, Ltd.	Shinagawa building of NTT Docomo
Experimental Center for Social System Technologies	The Bank of Fukuoka	Nomura Real Estate Development
Osaka branch of SQUARE ENIX CO., LTD.	A complex facility of Fujimino City	Rix Corporation
Cosmo Koki Co., Ltd.	Niigata TOYO	Nanwa Energy
Fukuoka Chamber of Commerce and Industry	JA HYOGO SHINREN	Fujitsu Kyushu System Services
FUJIPACIFIC MUSIC Inc.	Katahira Campus of Tohoku University	Fujitsu FSAS
NEC Fielding, Ltd.	Metal One	

Visitor Routes

Customer	Purpose	Design	Construction
Kubara Honke Group	A kitchen and tasting room for customers to enjoy new products	Shimizu Corporation	Shimizu Corporation
Kyushu Electric Power Co., Inc.	Visitor routes	West Japan Engineering Consultants, Inc.	Taisei Corporation
Mitsui & Co. Global Logistics, Ltd.	Visitor routes for the data center	UNIADEX	-
Mitsubishi Corporation	An exhibition room in Shanghai	Dentsu Inc.	Dentsu Inc.
Cuebic Inc.	Partition for a luxury foreign vehicle	Cornes Motors	Cornes Motors

Hospitals

Hospital	Purpose	Design	Construction
Self Defense Forces Fukuoka Hospital	CT room	-	Shimizu Corporation
Japanese Red Cross Kumamoto Hospital	Treatment room	Naito Architects	Shimizu Corporation
Kyushu University Hospital	MRI room	-	Kajima Corporation
Imamura Hospital	ICU room	-	Kajima Corporation
SUNAGAWA Medical Clinic	Guidance office and hallway	-	Okamura Corporation
Yamaguchi Prefecture Grand Medical Center	ICU room	-	Shimizu Corporation
Morioka Yuai Hospital	Operation room	Taisei Corporation	Taisei Corporation

This is only a partial list.

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Office Renovation



Reasons for adopting SILF

To hide sight, SILF is installed afterwards on bottom four levels of glass block partitions in the office.

The partition for the executive room which three executives use is all glass partition, through which employees were able to see inside the room before SILF was installed.

To hide sight, options including installing electric blinds had been considered; however, adoption of SILF was decided finally in order to show or not show the room inside with the flick of a switch.

In this instance, it took roughly one day to install SILF.

Type of film

Sticking type

Installation

On the existing glass

Installation Location

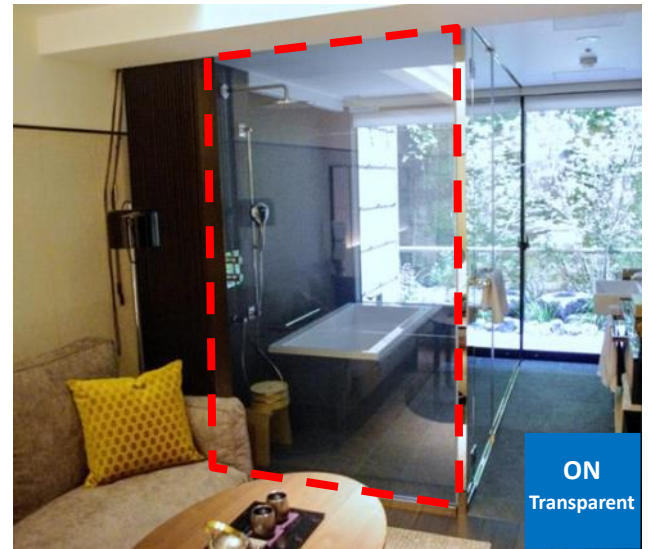
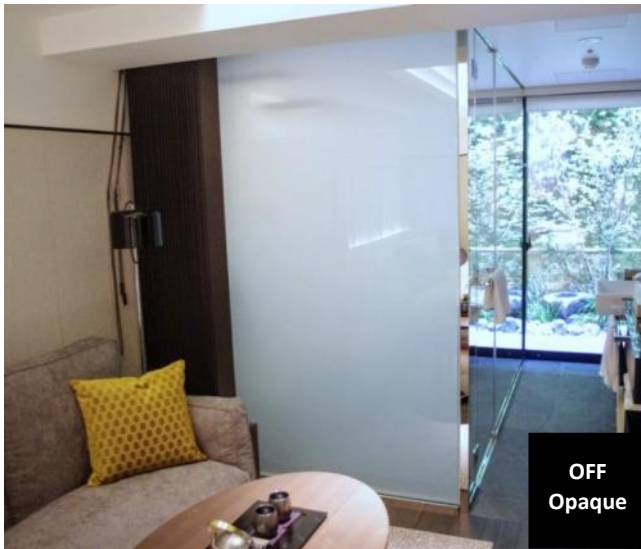
Office (Executive room)

Location

Tokyo



Bathrooms of a hotel



Reasons for adopting SILF

SILF is adopted on the glass partition of the bathroom working as a shutter when the guest is taking the bath.

When SILF is transparent, with light coming in, guests are able to enjoy the wide open space.

When the guest is taking the bath, SILF is turned off so that it works as a shutter.

SILF makes it possible to change the sight in a flash, replacing curtains and blinds.

Type of film

Sticking type

Installation

On recently installed glass

Installation Location

Bathrooms of a hotel

Location

Kyoto



Hospital (newly installed)



Reasons for adopting SILF

Doctors and nurses sometimes needed to confer with each other when simultaneous treatments were being administered.

With the flick of a switch, the glass changes from an opaque to a transparent state.

Glass type of SILF is installed on the partitions between two emergency rooms next to each other.

It is adopted for the convenience of communication among medical staff, patients, and their families.

Compared to curtains and blinds, SILF is easy to clean and dust does not build up.

Type of film

Glass type

Installation

On recently installed glass

Installation Location

An emergency room
in a hospital

Location

Kumamoto Prefecture



Hospital Renovation



Reasons for adopting SILF

SILF is installed on site on a kind of special glass (lead glass) which is used for shielding the radiation from CT.

As there is no changing room for patients to change before getting a CT scan, patients have to change in the CT room. In order to protect patients' privacy, SILF is adopted so that it can be turned off while the patient is changing.

Type of film

Sticking type

Installation

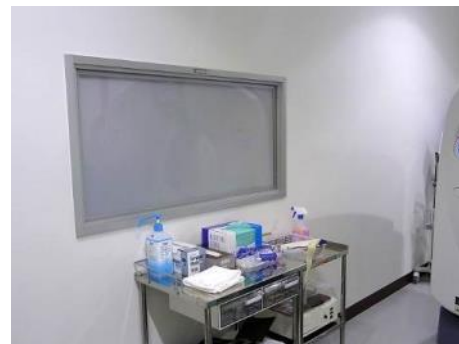
On the existing glass

Installation Location

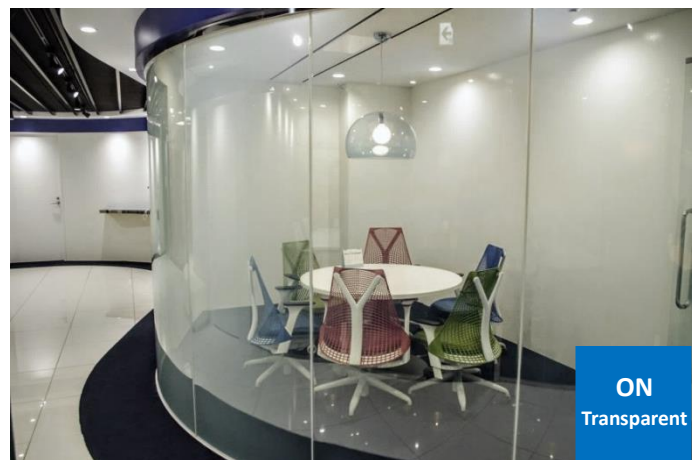
CT room in a Self-defense Forces Hospital

Location

Fukuoka Prefecture



Office (newly installed)



Reasons for adopting SILF

Because the whole floor consists of meeting rooms connected to each other, SILF has been adopted in order to showcase its expanded deep space.

The whole floor contains a lot of curved designs.

When trying to implement SILF on the curved glass of a modern meeting room, it is applied from the inner side of the room utilizing the features of the film.

By applying the switchable film on the glass door, the meeting rooms leave a refined and sophisticated impression.

Type of film

Sticking type

Installation

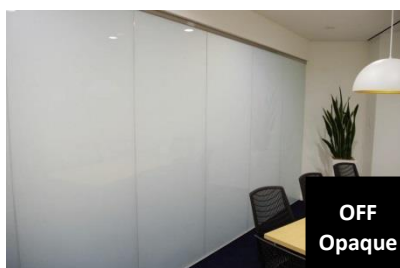
On recently installed glass

Installation Location

Office meeting room

Location

Tokyo



Partition for owner-driver cars



OFF
Opaque



ON
Transparent

Reasons for adopting SILF

SILF is installed on the partition between the front and back compartments of a luxury foreign vehicle, which enables the partition to change from a transparent to an opaque state to protect passengers' privacy.

Since the plastic partition is slightly curved, SILF is installed on the relatively flat part. When necessary, it is turned on to protect privacy of the passengers who sit in the back seats.

Because SILF uses an independent power source instead of on-vehicle power supply, a remote control is used to change the state of it.

This stylish function makes the luxury car stand out even more.

Type of film

Sticking type

Installation

Inside the car

Installation Location

On the partition between front and back compartments for a luxury vehicle

Location

Tokyo



■ Product Specification

➤ Rated Value

Item	Rated	Unit	Remarks
Drive Voltage	AC50 ±10%	V	Effective value (Sine wave or square wave)

- Thickness 0.26mm (only film)
- Maximum dimensions 1200mm×3000mm (we accept orders by millimeters)
- Power consumption 4W/m²
- Response speed Less than one second when turned ON or OFF
- Optical characteristics

※The values in the chart are representative values of the state of the film. They are not guaranteed values.

Function	Item	Value	Remarks
Transparency (power: ON)	Turbidity (Haze)	4.7%	Measuring device: NDH 5000 JIS-K7136 JIS-K7361-1 compliance
	Parallel Transparent Ratio	85.6%	
Opacity (power: OFF)	Turbidity (Haze)	97.0%	
	Parallel Transparent Ratio	2.4%	

- Electrification durability Passed the switching test of 3 million times

■ Precautions for use

- The product is for inside use.
- If SILF is reinstalled or reused after being removed it will not be guaranteed.
- When power is ON (transparency state), the property of transparency may deteriorate with the angle of view as seen from the front.
- Please use in an environment where there is no water, vapor, or fire.
- Contact by sharp or hard things can cause trouble.
- SILF is an electric product. Therefore be careful not to spray water or liquid cleaner directly on the film when cleaning it.
It will cause scratches or cuts when wiping it dry, please use a slightly wet cloth etc. to wipe it lightly.
- Be careful not to use conductive caulking compound.
- After SILF is delivered to the customer, requests for size modification (cutting work and dimension adjustment) are not accepted.
- Make sure to connect a ground wire to the exclusive power supply unit (power source).
- Please contact our company when there is anything not clear in regards to usage.

■ Warranty

- One year after delivery and installation

<Manufacturer>

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