sangetsu

CLEAS vol.3

Glass Film 2025-2028

For a CLEAR Tomorrow

CLEAS

A glass film sample book that balances functionality and stunning design: “CLEAS”
Alongside a wide selection of high-performance films offering excellent heat insulation and shatter resistance, CLEAS also features an array of decorative design films and environmentally conscious products, supporting a more sustainable society.
Sangetsu’s glass films—bringing you a clearer tomorrow.

RECYCLED PET FILM SERIES

Glass Films Made from Recycled PET Bottles —
A Step Toward a Decarbonized and Circular Society

Made with PET film using over 80%
recycled materials derived from PET bottles.

Functional Film

Recycled PET Transparent
Shatter-resistant Film
CLEICEA 90

GF1451 (P.12)

Matte / Frost

Lumikki R 75 NEW

GF1901 (P.23)

Lumikki R 50 NEW

GF1902 (P.23)

Lumikki R 35 NEW

GF1903 (P.23)

Design Film

Gradation

Ethico R NEW

GF1911 (P.37)

Pop Ethico R NEW

GF1912 (P.41)

Poetry R NEW

GF1913 (P.41)

Nord R NEW

GF1914 (P.41)

Asanoha R NEW

GF1915 (P.41)

Choosing Environmentally Friendly Materials

The ink is used in some part of the sample book

VOC FREE Ink

This ink contains no VOCs that contribute to greenhouse gas emissions.

The ink is used in some part of the Supplement Booklet

Vegetable Ink

This plant-based ink helps reduce soil pollution after disposal.

The ink is used in some part of the Supplement Booklet

Waterless Printing

An advanced printing technology that uses little to no water and generates no wastewater.

Project Examples

*Japanese only

Explore a range of completed projects
featuring CLEAS

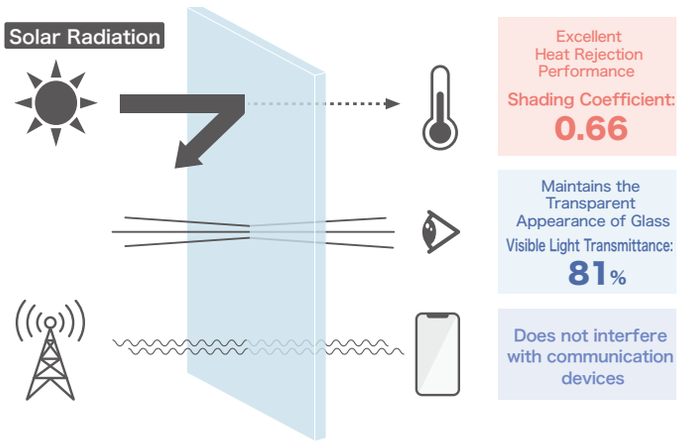
Multi-layer PET Heat Rejection Film

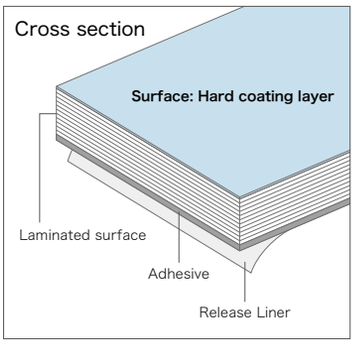
*Image for reference only

A multi-layer PET heat rejection film that combines transparency with excellent heat rejection performance.

1. Utilizes a specially layered PET film structure to deliver excellent heat rejection against solar radiation without compromising transparency.
2. Unlike typical heat rejection films that use metal layers, this non-metallic construction does not interfere with signals from communication devices.
3. Reduces glare caused by visible light reflection from the film.

data Versatile Functionality





Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/㎡ K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Gene HR 80	GF1461	960 / 1270 / 1524	50 / 50 / 30	76	51	8	81	16	44	40	< 1	0.66	58	6.1

The above test results are measured values only and are not guaranteed.

Multi-layer PET Heat Rejection Film

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Heat Rejection
Low Iridescence

Multi-layer PET Heat Rejection
Gene HR 80 NEW

GF1461-1 W960mm
GF1461-2 W1270mm
GF1461-3 W1524mm

High-range UV Protection & Heat Rejection Film

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Heat Rejection

High-range UV Protection & Heat Rejection Shinra HR 90 NEW

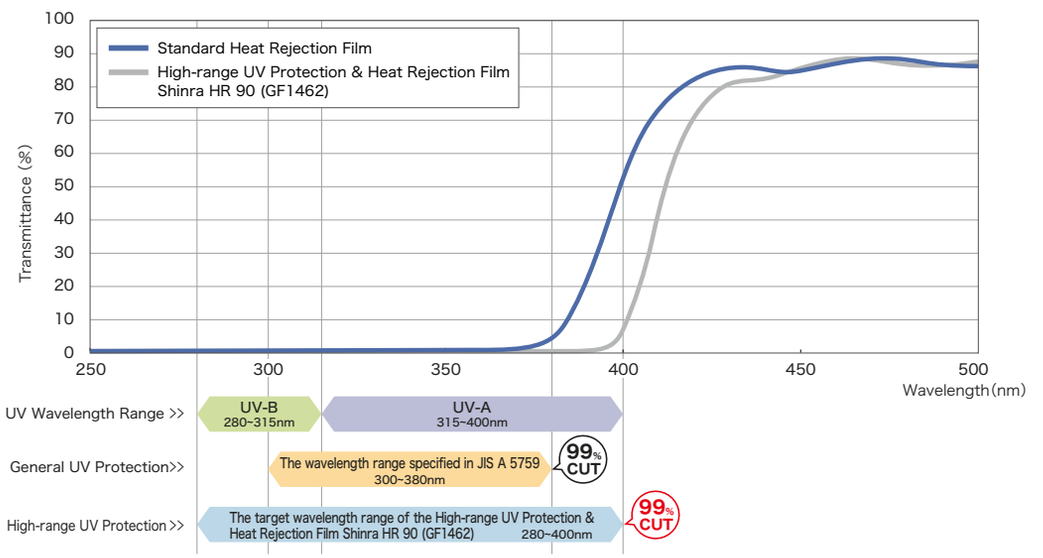
GF1462-1 W970mm
GF1462-2 W1250mm
GF1462-3 W1550mm

High-range UV Protection & Heat Rejection Film

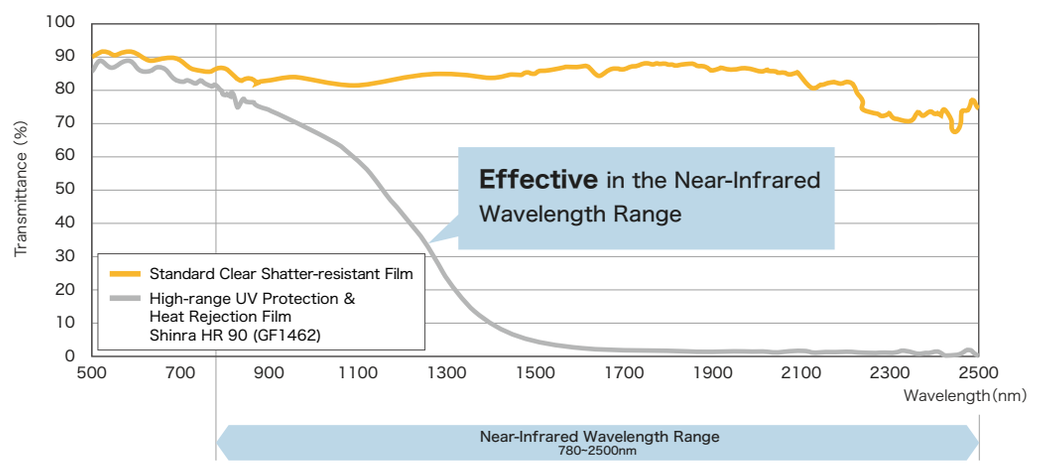
High-performance film with outstanding UV protection and heat rejection

1. Blocks 99% of UV-A (315–400 nm) and UV-B (280–315 nm).
2. Provides heat rejection without compromising the transparency of the glass.
3. Prevents scattered glass fragments, helping to ensure evacuation routes and reduce the risk of secondary damage during disasters.

data 1 UV Protection Performance



data 2 Heat Rejection Performance



Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/㎡ K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Shinra HR 90	GF1462	970 / 1250 / 1550	50 / 50 / 30	70	50	9	87	8	65	27	< 1	0.84	74	5.8

The above test results are measured values only and are not guaranteed.

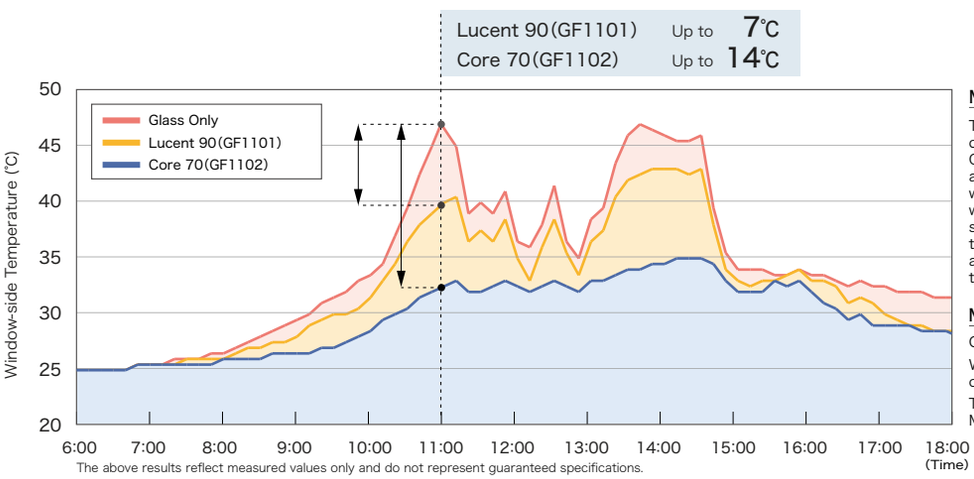
Clear Heat Rejection Film

A film that preserves glass transparency and delivers heat rejection performance

1. This heat rejection film offers high solar shielding performance, helping to keep rooms cool during the summer.
2. It maintains indoor brightness without compromising the transparency of the glass.

data 1 Temperature Comparison at the Window-side

Temperature Difference Compared to an Untreated Window



The above results reflect measured values only and do not represent guaranteed specifications.

Measurement Method

Temperature comparison was conducted between glass with GF1101 or GF1102 film applied and untreated glass at the window area. Thermometers were installed on the interior side of each window, and temperatures were measured at a distance of 15 cm from the window surface.

Measurement Conditions

Orientation:Southeast

Weather:Mostly sunny with occasional clouds

Temperature:Maximum 29.7°C, Minimum 20.3°C

data 2 Performance Comparison: Clear Heat Rejection Film vs. Low-E Film (Heat Rejection / Thermal Insulation Film)

Summer

Transparency

High Transparency Heat Rejection

Lucent 90

Shading Coefficient **0.85**

Visible Light Transmittance

(Before Application) (After Application)

91% → **88%**

Summer

Both Transparency and Heat Rejection Performance

Clear Heat Rejection

Core 70

Shading Coefficient **0.65**

Visible Light Transmittance

(Before Application) (After Application)

91% → **70%**

Summer **Winter**

Both Heat Rejection and Thermal Insulation Performance

Low-E (Low Emissivity)

Ecorim 70

Thermal Transmittance (U-value)

(Before Application) (After Application)

6.0W/㎡K → **4.5**W/㎡K

Shading Coefficient **0.59**

Visible Light Transmittance

(Before Application) (After Application)

91% → **68%**

Transparency Visible Light Transmittance: The higher the value, the greater the transparency

Shading Coefficient: The lower the value, the higher the heat rejection performance **Energy-saving Effect**

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Lucent 90	GF1101	970 / 1250 / 1550	50 / 50 / 30	69	50	9	88	7	67	26	< 1	0.85	75	5.8
Core 70	GF1102	970 / 1270 / 1524	50 / 50 / 30	73	50	20	70	28	50	22	< 1	0.65	57	5.5

The above test results are measured values only and are not guaranteed.

Clear Heat Rejection Film

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Heat Rejection
Reverse Installation

High Transparency Heat Rejection Lucent 90

GF1101-1 W970mm
GF1101-2 W1250mm
GF1101-3 W1550mm

Clear Heat Rejection Core 70

GF1102-1 W970mm
GF1102-2 W1270mm
GF1102-3 W1524mm

* Please note: Core 70 (GF1102) reflects interior lighting and other light sources when viewed from inside. This effect is especially noticeable at night, as it can reduce visibility of the outside while making the interior more visible.

Low-E Film
(Heat Rejection & Thermal Insulation Film)

The film's effect on reducing CO_2 emissions during operation can be calculated

Simulation Example

Estimation Conditions

Location: Office in Shinagawa, Tokyo
(approx. 1,090 m²)
Cooling: June–September,
set temperature 22°C
Heating: November–February,
set temperature 28°C
Installation Area: South side 120 m²,
North side 24 m²
Product Number: GF1206
(Low-E Film Ecorim 70)

CO_2 Emission Reduction During Operation

1.3 tons per year

*Plants generally absorb CO_2 (carbon dioxide) and release oxygen. Calculations are based on the assumption that one Japanese cedar tree (Cryptomeria japonica), approximately 20 to 30 meters tall and 50 years old, absorbs an average of about 14 kg of carbon dioxide per year.

Source: "Greenhouse Gas Absorption Measures for the Prevention of Global Warming," Environment Agency of Japan

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Heat Rejection
Low-E
Reverse Installation

Low-E (Low Emissivity)
Ecorim 70

GF1206-2 W1270mm
GF1206-3 W1524mm

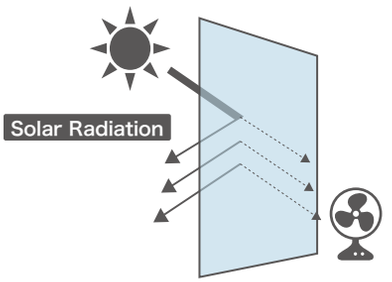
* Please note: Ecorim 70 (GF1206) reflects interior lighting and other light sources when viewed from inside. This effect is especially noticeable at night, as it can reduce visibility of the outside while making the interior more visible.

Low-E Film (Heat Rejection & Thermal Insulation Film)

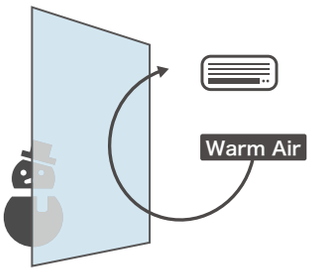
Low-E Film (Heat Rejection & Thermal Insulation Film)

1. In summer, blocks solar heat to prevent indoor temperature rise.
2. In winter, retains indoor warmth by preventing heat from escaping through windows.
3. Provides energy-saving benefits throughout the year.

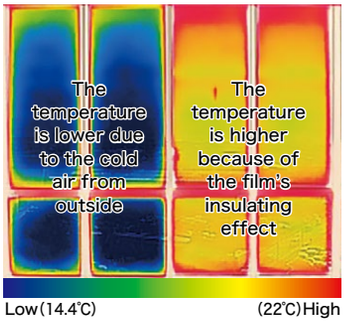
Summer Blocks external heat from entering.



Winter Prevents indoor heat from escaping.



data 1 Thermographic Comparison in Winter



Measurement Method

The window surface with GF1206 applied was measured using thermography, and its temperature distribution was compared to that of an untreated window surface.

Measurement Conditions

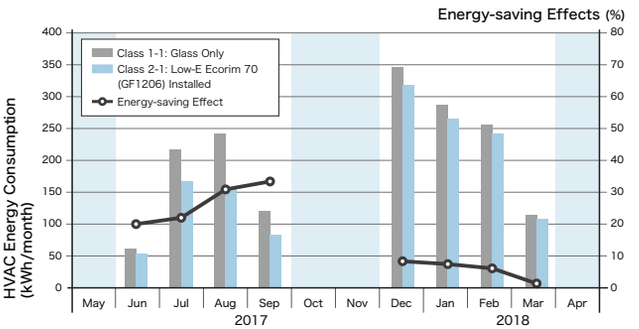
Weather: Clear
Measurement Time: 9:00 AM
Temperature at Time of Measurement: 6°C
Air Conditioner Set Temperature: 20°

With the heater set to 20°C and the outside temperature at 6°C, the glass surface with the film applied retained more indoor warmth.

* The test results are measured values and are not guaranteed.

data 2 Annual HVAC Energy Consumption and Verification of Energy-saving Effects

We evaluated the daytime energy-saving effects over eight months by comparing two adjacent classrooms in a school.



* The test results are measured values and are not guaranteed.

Measurement Method

HVAC energy consumption was compared between a window with GF1206 applied and a standard glass window.

Measurement Conditions

Verification Location:
Mie Prefectural Iino High School (Suzuka City, Mie Prefecture), Building 1, 3rd Floor

Classrooms: 1st Grade Class 1 / 2nd Grade Class 1
Basic HVAC Operating Conditions:
8:30 AM – 4:00 PM / Cooling: 28°C / Heating: 19°C

Glass Specifications:
Orientation: South and North
Type: Clear float glass, 3mm thick
Application Area: 19.4 m² (South side: 12 m², North side: 7.4 m²)

The installation of Low-E Ecorim 70 (GF1206) resulted in a confirmed annual energy savings of 15%.

Breakdown: 27.5% energy savings during cooling and 7.1% during heating.

Energy-saving effects were observed during both the cooling and heating periods, with notably higher savings during the cooling period. In the heating period, two opposing effects occur simultaneously: the insulating effect, which reduces heat loss (a positive effect), and the heat-rejection effect, which reduces heat gain (a negative effect). These may partially cancel each other out, leading to a lower overall energy-saving outcome. Therefore, greater energy savings during the heating season are expected when there is little or no direct sunlight.

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Ecorim 70	GF1206	1270 / 1524	30	94	50	19	68	29	47	24	< 1	0.59	52	4.5

The above test results are measured values only and are not guaranteed.

Solar Control Film (Solar Adjustment / Mirror / Privacy)

Shadow 40 / **GF1113**

Shadow 20 / **GF1114**

Steam Shadow 20 / **GF1410**

Bronze 50 / **GF1111**

Bronze 20 / **GF1112**

Steam Bronze 20 / **GF1411**

Mirror 40 / **GF1106**

Mirror 20 / **GF1108**

Mirage / **GF1822**

Perfect White II / **GF1463**

Perfect Black / **GF1413**

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Shadow 40	GF1113	970 / 1250	50	83	50	6	43	6	59	35	< 1	0.81	71	6.0
Shadow 20	GF1114	970 / 1250	50	83	50	5	20	6	48	46	< 1	0.73	64	6.0
Steam Shadow 20	GF1410	1250	50	115	75	5	19	7	44	49	< 1	0.69	61	6.0
Bronze 50	GF1111	970 / 1250	50	83	50	6	52	6	64	30	< 1	0.84	74	6.0
Bronze 20	GF1112	970 / 1250	50	83	50	5	26	6	51	43	< 1	0.74	65	6.0
Steam Bronze 20	GF1411	1250	50	115	75	5	23	7	46	47	< 1	0.70	62	6.0
Mirror 40	GF1106	970 / 1250	50	78	50	32	40	31	32	37	< 1	0.50	44	5.8
Mirror 20	GF1108	970 / 1250 / 1525	50 / 50 / 30	78	50	58	16	52	12	36	< 1	0.26	23	5.7
Mirage	GF1822	1250	50	68	50	83	0	73	0	27	< 1	0.10	9	5.8
Perfect White II	GF1463	1524	30	59	50	50	9	43	11	46	< 1	0.31	27	6.1
Perfect Black	GF1413	1524	30	86	75	5	0	5	0	95	< 1	0.37	33	5.9

The above test results are measured values only and are not guaranteed.

Shatter-Resistance UV UV Protection Insect Repellence
Hard Coating Heat Rejection Reverse Installation

Solar Adjustment

Shadow 40

GF1113-1 W970mm
GF1113-2 W1250mm

Shadow 20

GF1114-1 W970mm
GF1114-2 W1250mm

Steam Shadow 20

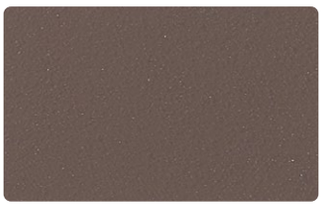
GF1410 W1250mm

Bronze 50

GF1111-1 W970mm
GF1111-2 W1250mm

Bronze 20

GF1112-1 W970mm
GF1112-2 W1250mm

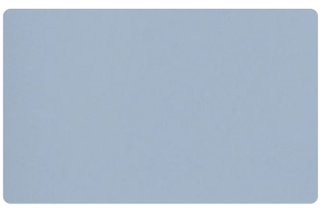


Steam Bronze 20

GF1411 W1250mm

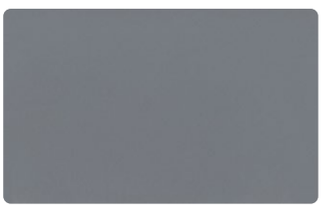
High-range UV Protection / Clear Shatter-resistant

Mirror



Mirror 40

GF1106-1 W970mm
GF1106-2 W1250mm



Mirror 20

GF1108-1 W970mm
GF1108-2 W1250mm
GF1108-3 W1525mm

Mirage

GF1822 W1250mm

Privacy

Perfect White II NEW

GF1463 W1524mm

Perfect Black

GF1413 W1524mm

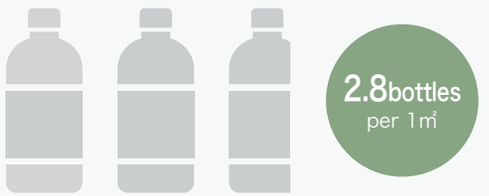
* Mirror 40 (GF1106) and Mirror 20 (GF1108) reflect interior lighting and other light sources when viewed from inside. This effect is especially noticeable at night, as it can reduce visibility of the outside while making the interior more visible.
* Mirage (GF1822) has a mirror-like surface with no transparency; however, please note that it does not offer a perfectly clear reflection like a traditional mirror.
* Due to its material characteristics, Perfect White II (GF1463) does not have a hard coat. Please handle with extra care.
* When exposed to external light or strong illumination, Perfect White II (GF1463) may show visible streaks or unevenness due to transmitted light.
* While Perfect White II (GF1463) and Perfect Black (GF1413) are effective at blocking light, they cannot completely prevent light leakage at seams or edges.

Clear Shatter-resistant Film

Clear Glass Film (Recycled PET) | CLEICEA 90

1. Made from PET film containing over 80% recycled materials derived from PET bottles. This product is Eco Mark certified.
2. Offers the same level of shatter resistance and UV protection as conventional products, ensuring safe and reliable use.

data 1 Quantity of Recycled PET Bottles



We use recycled PET bottles (equivalent to 2.8 bottles per 1㎡) .*1

data 2 Reduction of CO_2 Emissions During the Manufacturing Process

Compared to standard clear shatter-resistant films*2, we have achieved a 10% reduction in CO_2 emissions during the manufacturing process.

If applied to 700 m² of window area,

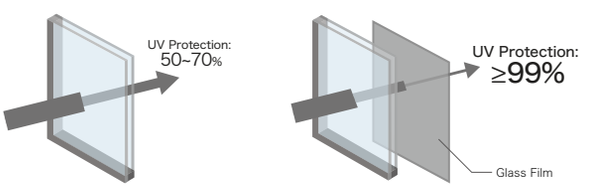
this would be equivalent to recycling approximately 2,000 PET bottles*1 and could reduce CO_2 emissions by around 100 kg.

*1 Based on 500 ml PET bottles weighing approximately 20 g each. *2 Compared to standard clear shatter-resistant film made entirely from petroleum-derived PET

Standard Clear Glass Film | Chiaro 90 / Kind 90

1. Blocks 99% of UV rays, helping protect skin and interior furnishings from sunburn and fading.
2. Prevents scattered glass fragments, helping to ensure evacuation routes and reduce the risk of secondary damage during disasters.

data 1 UV Protection Performance (JIS A 5759)



Standard insulated glass

Standard insulated glass + UV-cut glass film

Comparison of Interior Fading Due to Sun Exposure

Test Method

A tile carpet made from solution-dyed nylon was placed under plain glass and glass with protective film, then exposed to a xenon test chamber. After 250 hours of irradiation, changes in appearance were evaluated and compared.

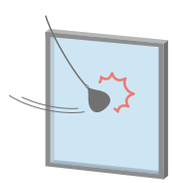
Before Testing | Float Glass + **Clear Shatter-resistant Chiaro 90(GF1204)** | Float Glass Only

data 2 Shatter-resistant Performance (JIS A 5759)

The Japanese Industrial Standards (JIS) specify two types of shatter-resistance tests: Method A and Method B.

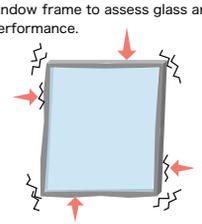
Method A:Impact Destruction Test (= Shot Bag Test)

Simulates accidental impacts, such as a person striking the glass.



Method B: Interlayer Displacement Test

Simulates an earthquake by deforming the window frame to assess glass and film performance.



The shatter-resistant certification mark is applied when a product complies with either Method A or Method B of the JIS standard (2008 revision).

Test Image Diagram

Float Glass Only
Glass scatters on impact.

Film-Applied Glass
Reduced scattering even when broken.

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m²K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
CLEICEA 90	GF1451	970 / 1250 / 1524	50 / 50 / 30	78	50	11	89	10	82	8	< 1	0.97	85	6.1
Chiaro 90	GF1204	960 / 1220 / 1524	50 / 50 / 30	76	50	8	89	8	81	11	< 1	0.97	85	6.1
Kind 90	GF1452	960 / 1270 / 1524	50 / 50 / 30	67	50	8	90	7	83	10	< 1	0.98	86	6.1

The above test results are measured values only and are not guaranteed.

Clear Shatter-Resistant Film

Shatter-Resistance
UV UV Protection
Insect Repellence
Hard Coating
Low Iridescence

Clear Shatter-Resistant Film (Recycled PET) CLEICEA 90

GF1451-1 W970mm
GF1451-2 W1250mm
GF1451-3 W1524mm

Eco Mark Certified Product Sangetsu Corporation

GOOD DESIGN

Clear Shatter-Resistant Film Chiaro 90

GF1204-1 W960mm
GF1204-2 W1220mm
GF1204-3 W1524mm

Clear Shatter-Resistant Film Kind 90

GF1452-1 W960mm
GF1452-2 W1270mm
GF1452-3 W1524mm

Unable to export to Korea

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Low Iridescence

High-range UV Protection Film Unfade 90

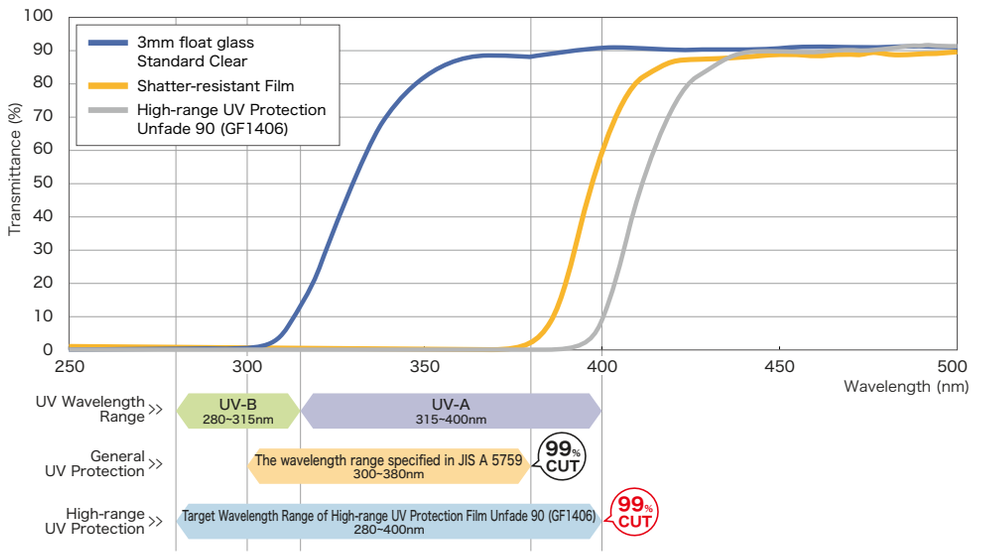
GF1406-1 W970mm
GF1406-2 W1250mm

* The 380–400 nm range overlaps with the visible light spectrum. Since the film is designed to block these wavelengths as well, the product has a slight yellow tint.

High-range UV Protection Film

Film with UV protection in the 280 - 400 nm wavelength range

1. Blocks 99% of UV-A (315–400 nm) and UV-B (280–315 nm) rays.
2. Helps protect skin and interior surfaces from sunburn and fading.



About Ultraviolet Rays

According to the JIS standard for window films (JIS A 5759), the defined ultraviolet wavelength range is 300–380 nm.

However, UV rays also exist outside this range, specifically from 280–300 nm and 380–400 nm.
While UV radiation in these extended ranges is generally considered lower risk, the overall amount of UV reaching the Earth's surface has increased in recent years.

For those seeking greater UV protection, we recommend products with enhanced UV-blocking performance across the full 280–400 nm range.

Comparison of Curtain Fading Caused by UV Rays

Before Testing

Float Glass
+
High-range UV Protection Film Unfade 90 (GF1406)

Float Glass
+
Standard Clear
Shatter-resistant Film

Float Glass Only

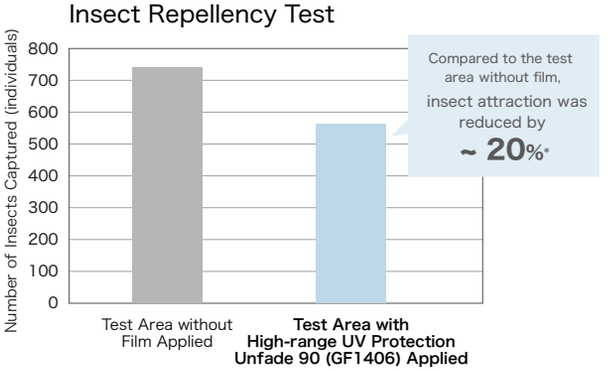
Test Specimen

Curtain (Linen)

Test Method

Following JIS K 7350-2 [Cycle A: 18 minutes wetting, 102 minutes drying; continuous operation, BST], curtain samples shielded by either bare glass or film-applied glass are subjected to 500 hours of exposure in a xenon weathering tester. Subsequent changes in appearance are then assessed and compared.

Insect Repellency Test



Test Method

Two glass tanks (30 × 30 × 30 cm) were prepared: one with its interior surfaces covered by a high-range UV protection film, and the other left uncoated for comparison.
A 6W straight fluorescent lamp was placed inside each tank, and insect adhesive traps were attached to the interior surfaces.
After sunset, the tanks were placed outdoors and the lamps were switched on.
The number of insects attracted and captured by the ultraviolet light was then compared between the two setups.

Test Results

Compared to the test area without film, the area with high-range UV protection film captured approximately 20% fewer insects.*

Main insect types captured: caddisflies, planthoppers, leafhoppers, non-biting midges, and

* Test results are based on measured values and are not guaranteed.
* The film is not effective against insects that do not exhibit phototaxis (attraction to ultraviolet light).

Recommended Installation Sites

- Large windows and skylights
- Windows in rooms where natural daylight is desired
- Display windows in street-level shops

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Unfade 90	GF1406	970 / 1250	50	73	50	8	91	7	82	11	< 1	0.98	86	6.0

The above test results are measured values only and are not guaranteed.

Security Film

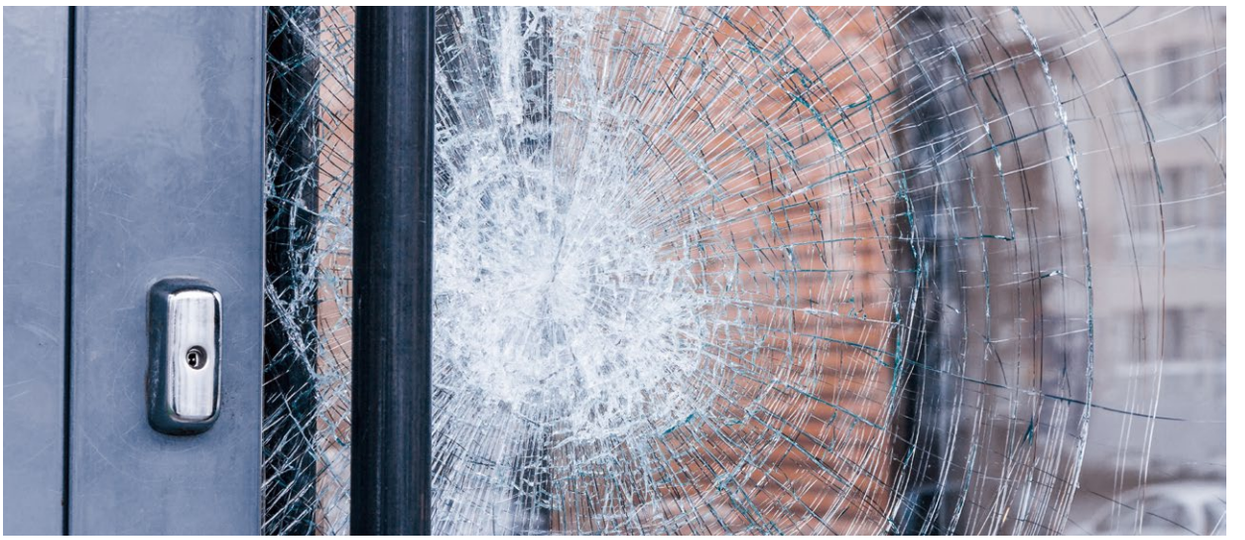


*Image for reference only

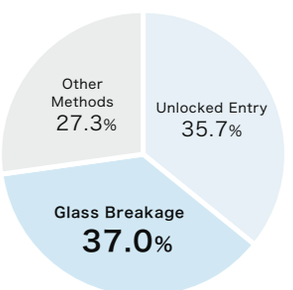
High Impact Resistant Clear Glass Film

1. By using a 350 μm-thick PET film, this product provides greater impact resistance than standard PET films.
2. Helps deter intrusion by resisting glass breakage.
3. Blocks 99% of UV rays, helping protect skin and interior furnishings from sun damage and fading.

Security Film Fortis 90 (GF1464) is currently undergoing the certification process*2 for the CP Mark*1.

*1 CP Mark: A certification awarded only to building components listed in the "List of Building Components with Superior Anti-Crime Performance."
*2 Information current as of December 2024.

Residential Burglary Entry Methods (2023)



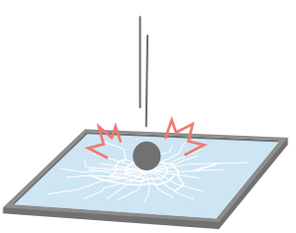
Over 30% of residential burglaries involve glass breakage.
Applying security film to windows increases the time required to gain entry by delaying both breakage and access—helping to deter criminal activity.

Note: Security film does not guarantee complete prevention of intrusion.

Source: Based on data from the National Police Agency, 2023 Statistics on Penal Code Offenses, p. 32.

data Glass Penetration Resistance Test (JIS A 5759)

With its durable 350 μm-thick PET film, this product offers high impact resistance and is designed to prevent penetration even if the glass is shattered.



Test Method

A security film is applied to 5 mm float glass, and an impactor (a 4.11 kg steel ball) is dropped from a height of 3 meters onto three different points on the glass surface to verify whether the impactor penetrates the glass.

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						熱的性能		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/㎡ K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Fortis 90	GF1464	960 / 1220	10	447	350	9	88	9	80	11	< 1	0.95	84	6.1

The above test results are measured values only and are not guaranteed.

Security Film

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Low Iridescence

Security Film Fortis 90 NEW

GF1464-1 W960mm
GF1464-2 W1220mm

* For detailed product information and installation instructions, please refer to the separate booklet.

Shatter-Resistance
UV Protection
Insect Repellence
Hard Coating
Low Iridescence

Safety Film Toughbarrier 90

GF1404-1 W960mm
GF1404-2 W1220mm

Safety Film

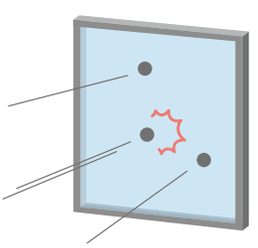
Clear Glass Film with Superior Impact Resistance

1. 100 µm-thick film that has passed impact tests simulating flying debris during strong winds.
2. Blocks 99% of UV rays, helping protect skin and interiors from sun damage and fading.

data 1 The Missile Collision Test (JIS R 3109)

A thicker PET film is used compared to standard shatter-resistant glass films.
In addition to meeting the shatter resistance criteria specified in JIS A 5759, it also helps reduce glass breakage caused by flying debris impacts.
Safety Film Toughbarrier 90 (GF1404) is a certified product that complies with the requirements for missile A.

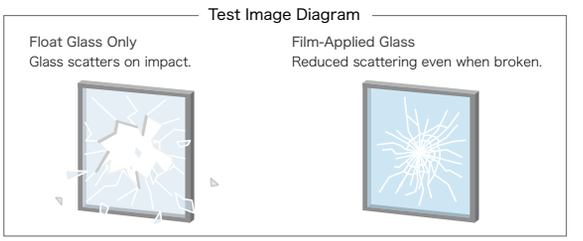
Missile Collision Test
A test simulating flying debris impacts during strong winds



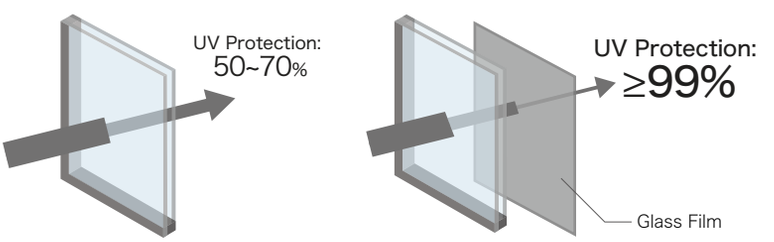
Test Method

A 100 µm-thick film is applied to 6 mm float glass, and Impact Body A (ten 2 g steel balls) is used to test the film for any tearing or openings upon impact.

Test Image Diagram



data 2 UV Protection Performance (JIS A 5759)



Standard insulated glass

Standard insulated glass
+
UV-cut glass film

Structural damage from major typhoons and high winds has become more frequent in recent years. The use of safety films is recommended as a proactive measure to enhance protection during such incidents.

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (µm)	Base Film Thickness (µm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/㎡ K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Toughbarrier 90	GF1404	960 / 1220	30	125	100	8	89	8	81	11	< 1	0.97	85	6.1

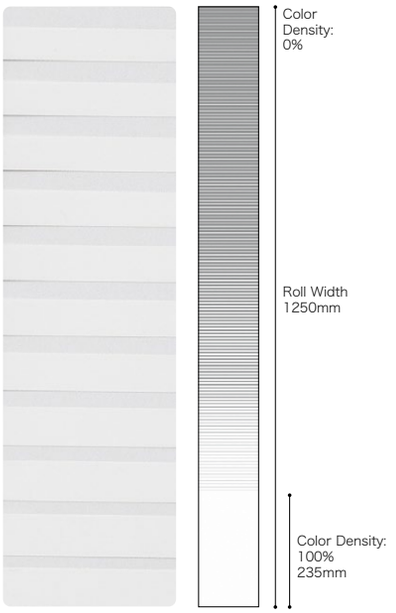
The above test results are measured values only and are not guaranteed.

Exterior Use Film

Circular EX ／ **GF1851** (Horizontal use)

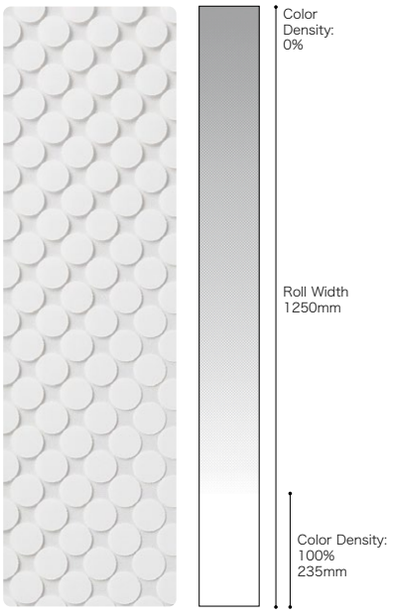
Horizon EX ／ **GF1850** (Horizontal use)

Shatter-Resistance UV UV Protection Insect Repellence
Hard Coating Heat Rejection EX Exterior Use
Reverse Installation



Horizon EX

GF1850 W1250mm
Horizontal use
* Available for Interior Use (P.25)



Circular EX

GF1851 W1250mm
Horizontal use
* Available for Interior Use (P.25)

Exterior Use Clear Shatter-resistant Film Chiaro 90EX

GF1105-1 W960mm
GF1105-2 W1220mm
GF1105-3 W1524mm

Exterior Use Clear Heat Rejection Film Vist 65EX

GF1453-1 W970mm
GF1453-2 W1250mm

Mirror 20EX

GF1110-1 W970mm
GF1110-2 W1250mm
GF1110-3 W1525mm

Misty Mist 90

GF1719 W1220mm

Misty Mist 30

GF1849 W1220mm

Low-reflection For Patterned & Frosted Glass

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Chiaro 90EX	GF1105	960 / 1220 / 1524	50 / 50 / 30	78	50	8	88	8	81	11	< 1	0.97	85	6.1
Vist 65EX	GF1453	970 / 1250	30	70	50	21	68	33	48	19	< 1	0.57	50	5.6
Mirror 20EX	GF1110	970 / 1250 / 1525	50 / 50 / 30	75 / 75 / 103	50 / 50 / 75	56	18	51	14	35	< 1	0.28	25	5.7
Misty Mist 90	GF1719	1220	50	166	130	9	86	8	78	14	< 1	0.94	83	6.1
Misty Mist 30	GF1849	1220	50	166	130	45	30	34	35	31	< 1	0.51	45	6.1

The above test results are measured values only and are not guaranteed.

* Please handle products without a hard coating with extra care.
* Products marked with the "Exterior Use" icon can be installed on the outside surface of glass; however, exposure to environmental conditions may cause them to deteriorate faster than expected. Regular replacement is recommended.

Low-reflection Film Luclear II

Reducing Glass Reflections

1. Ideal for areas where minimizing glass reflections and enhancing visibility is important.
2. Provides excellent performance in reducing glare and unwanted reflections.

Before

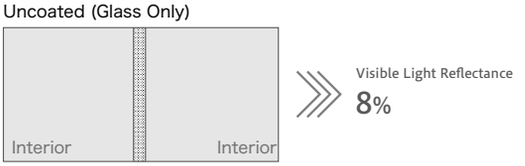
After

Toyo Bunko Museum
Photo: SS KIKAKU.inc

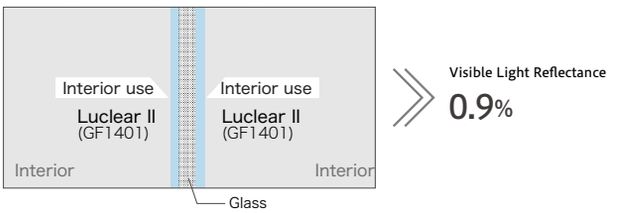
data Comparison of Application Methods on Both Sides of the Glass

Interior Side Application

Uncoated (Glass Only)

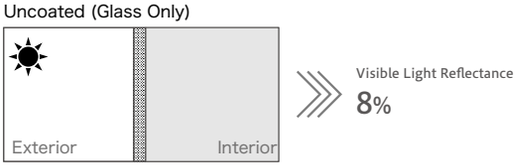


After Application (Luclear II applied to both sides)

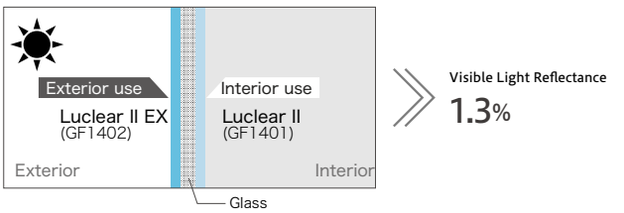


Exterior Side Application

Uncoated (Glass Only)



After Application (Luclear II and Luclear II EX applied to both sides)



Low-reflection Film Luclear II provides optimal reflection reduction when applied to both sides of the glass. Please select either Luclear II (GF1401) or Luclear II EX (GF1402) based on the glass installation environment.

* Test methods conform to JIS A 5759.
* 3 mm float glass was used for testing.
* The above results reflect measured values only and do not represent guaranteed specifications.

Recommended Applications

- Display cases in art museums and museums
- Observation decks and restaurants with scenic views
- Show windows in tenant spaces and street-level shops

This product is ideal for locations where you want to clearly showcase items or displays behind glass, or where minimizing interior reflections and maximizing visibility of outside scenery is important.

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Luclear II	GF1401	1220 / 1500	50 / 30	76	50	0.9	96	3	85	12	< 1	1.00	88	6.0
Luclear II EX	GF1402	1220 / 1500	50 / 30	78	50	1.3	96	3	85	12	< 1	1.00	88	6.0

The above test results are measured values only and are not guaranteed.

* The values for Luclear II refer to its application on both sides of the glass.
* The values for Luclear II EX refer to its application on both sides of the glass in combination with Luclear II.

Low-reflection Film

Shatter-Resistance
UV UV Protection
Insect Repellence
Hard Coating
EX Exterior Use

Luclear II

GF1401-2 W1220mm
GF1401-3 W1500mm

Luclear II EX

GF1402-2 W1220mm
GF1402-3 W1500mm

* To achieve the anti-reflection effect, the film must be installed on both sides of the glass.
* The anti-reflection effect may not be achieved if the glass is exposed to strong direct sunlight, if there is reflection from a direct light source, or if the film is applied to high-reflectance glass such as insulating or heat-reflective glass.
* Luclear II EX (GF1402) can be installed on the exterior surface of the glass. However, due to exposure to outdoor environmental conditions, the film may deteriorate more quickly than expected. Regular replacement is recommended.
* After installation, Luclear II (GF1401) and Luclear II EX (GF1402) may exhibit a slight purplish reflection.

Shatter-Resistance UV Protection
Insect Repellence
Hard Coating Heat Rejection
Reverse Installation

Free Fit III

GF1421-1 W970mm
GF1421-2 W1250mm

Free Fit III Pearl NEW

GF1456 W1250mm

* Fine bubbles may remain if applied to the textured side of patterned glass.
* The glass surface may appear cloudy after installation.
* This product is intended for dry application only (do not use water). Please refer to the separate booklet for more information.
* Application on tempered patterned glass is not recommended, as it may affect the appearance.
* Free Fit III Pearl (GF1456) contains pearl ink, which reflects interior lighting and other light sources when viewed from inside.

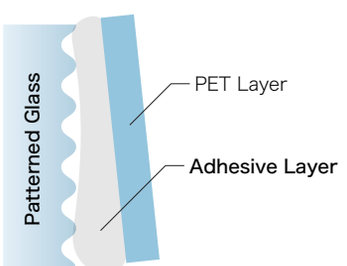
Patterned & Frosted Glass Film Free Fit III

Suitable for Installation on Textured Glass

1. This film for patterned and frosted glass complies with the JIS A 5759 shatter-resistance performance standard.*
   *Tested on 5 mm float glass, 4 mm patterned glass, and 5 mm frosted glass.
2. Suitable for installation on textured surfaces that are not compatible with standard glass films.

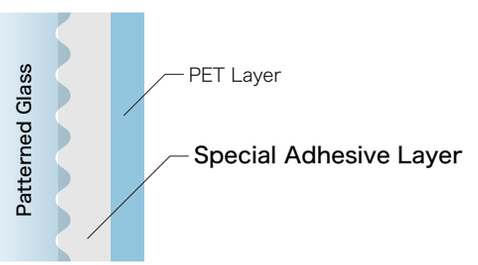
data 1 Construction Diagram

Adhesive Layer of Standard Shatter-resistant Film



Loses adhesion on textured surfaces

Adhesive Layer of Free Fit III



Adheres firmly even to textured surfaces

data 2 Surface Comparison: Before / After Installation

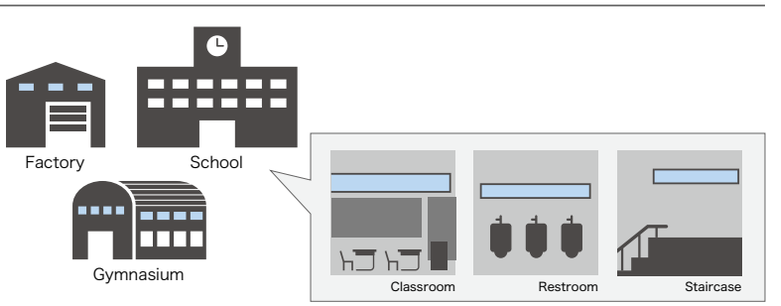
Patterned Glass

Patterned Glass
+
Free Fit III (GF1421)

Patterned Glass
+
+Free Fit III Pearl (GF1456)

data 3 Common Applications of Patterned and Frosted Glass

Patterned and frosted glass are widely installed in facilities such as factories and schools. For disaster mitigation during earthquakes or typhoons, we recommend applying Free Fit III to minimize glass shatter risk.



Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m²K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Free Fit III	GF1421	970 / 1250	30	205	100	8	89	8	81	11	< 1	0.96	84	6.1
Free Fit III Pearl	GF1456	1250	30	202	100	33	58	24	61	15	< 1	0.75	66	6.1

The above test results are measured values only and are not guaranteed.

Matte / Frost / Gradation

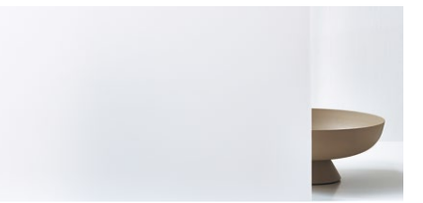
Matte / Frost

Filmy II 85 / **GF1891** Unable to export to Korea

Filmy II 50 / **GF1892** Unable to export to Korea

Diffuse 90 / **GF1819**

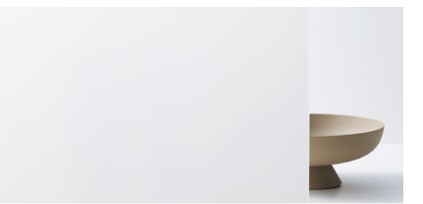
Pilvi 70 / **GF1712**



Lumikki 30 / **GF1715**

Lumikki R 75 / **GF1901**

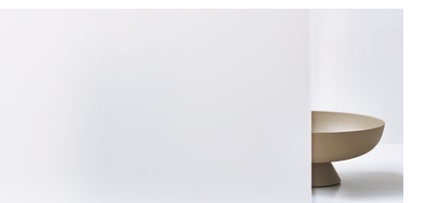
Lumikki R 50 / **GF1902**



Lumikki R 35 / **GF1903**

Steam 85 / **GF1718**

Steam 80 / **GF1717**



Steam 35 / **GF1821**

White Pearl 40 / **GF1716**

Product Name	Product Number	Product Width (mm)	Roll Length (m)	Total Thickness (Excluding Release Liner) (μm)	Base Film Thickness (μm)	When applied to 3mm thick float glass								
						Optical Properties						Thermal Properties		
						Visible Light		Solar Radiation			UV Transmittance (%)	Shading Coefficient	Solar Heat Gain Coefficient(%)	Thermal Transmittance (U-value) (W/m² K)
						Reflectance(%)	Transmittance(%)	Reflectance(%)	Transmittance(%)	Absorption(%)				
Filmy II 85	GF1891	1010 / 1200	30	151	130	9	82	8	76	16	—	0.93	82	6.2
Filmy II 50	GF1892	1010 / 1200	30	151	130	24	48	17	53	30	—	0.73	64	6.2
Diffuse 90	GF1819	970 / 1250	50	73	50	8	88	8	80	12	< 1	0.96	84	6.0
Pilvi 70	GF1712	970 / 1250	50	65	50	15	73	12	68	20	< 1	0.85	75	6.0
Lumikki 30	GF1715	970 / 1250	50	67	50	30	28	22	34	44	< 1	0.56	49	6.0
Lumikki R 75	GF1901	970 / 1250	50	79	50	12	73	10	71	19	< 1	0.90	79	6.0
Lumikki R 50	GF1902	970 / 1250	50	79	50	24	50	16	52	32	< 1	0.73	65	6.0
Lumikki R 35	GF1903	970 / 1250	50	79	50	35	33	24	38	38	< 1	0.61	53	6.0
Steam 85	GF1718	970 / 1250	50	76	50	10	84	9	76	15	< 1	0.92	81	6.0
Steam 80	GF1717	970 / 1250	50	76	50	11	81	9	74	17	< 1	0.90	79	6.0
Steam 35	GF1821	970 / 1250	50	76	50	28	33	21	37	42	< 1	0.59	52	6.0
White Pearl 40	GF1716	970 / 1250	50 / 30	75	50	43	43	32	49	19	< 1	0.63	55	6.0

The above test results are measured values only and are not guaranteed.

Shatter-Resistance UV UV Protection Insect Repellence
Hard Coating Heat Rejection Reverse Installation

Matte / Frost (PVC)

Filmy II 85 NEW
GF1891-1 W1010mm
GF1891-2 W1200mm

Filmy II 50 NEW
GF1892-1 W1010mm
GF1892-2 W1200mm

* Filmy II 85 (GF1891) and Filmy II 50 (GF1892) are for indoor use only. Do not apply to exterior-facing glass.
* A paper release liner is included to protect the adhesive surface.
* Sample is provided with base film only to confirm the transparency.

Matte / Frost (PET)

Diffuse 90
GF1819-1 W970mm
GF1819-2 W1250mm

Pilvi 70
GF1712-1 W970mm
GF1712-2 W1250mm

Lumikki 30
GF1715-1 W970mm
GF1715-2 W1250mm

Lumikki R 75 NEW
GF1901-1 W970mm
GF1901-2 W1250mm

Lumikki R 50 NEW
GF1902-1 W970mm
GF1902-2 W1250mm

Lumikki R 35 NEW
GF1903-1 W970mm
GF1903-2 W1250mm

Steam 85
GF1718-1 W970mm
GF1718-2 W1250mm

Steam 80
GF1717-1 W970mm
GF1717-2 W1250mm

Steam 35
GF1821-1 W970mm
GF1821-2 W1250mm

White Pearl 40
GF1716-1 W970mm
GF1716-2 W1250mm

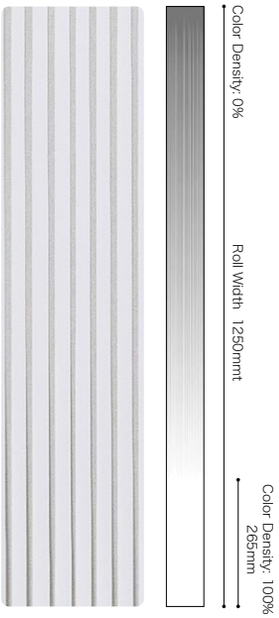
* Due to the characteristics of Lumikki 30 (GF1715), the printed layer may peel off when exposed to scratches, abrasion, alcohol-based cleaners, or other external factors. Please handle with care.
* White Pearl 40 (GF1716) contains pearl ink, which reflects interior lighting and other light sources when viewed from inside. This may reduce visibility to the outside, especially at night.

Side Gradation

Loska G ／ **GF1908** (Horizontal use)

Sandy G ／ **GF1909** (Horizontal use)

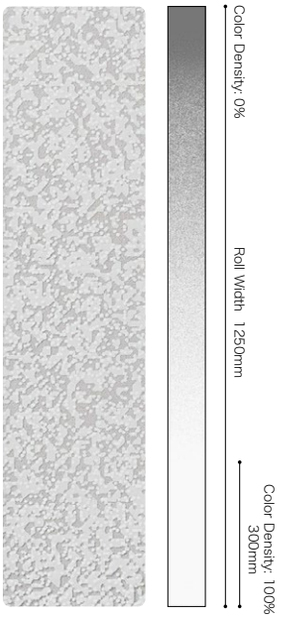
Shatter-Resistance UV UV Protection Insect Repellence Hard Coating



Prickly NEW

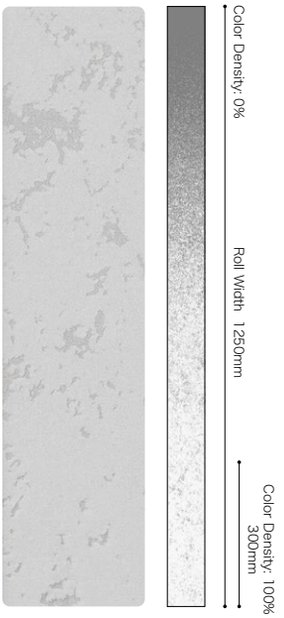
GF1907 W1250mm
Horizontal use
UV

Unable to export to Korea



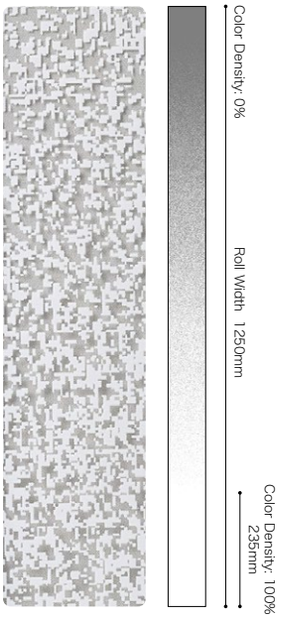
Sandy G NEW

GF1909 W1250mm
Horizontal use
UV



Loska G NEW

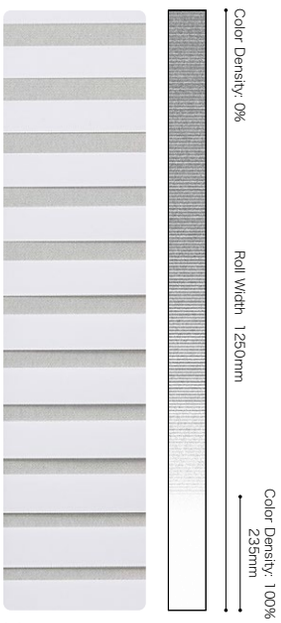
GF1908 W1250mm
Horizontal use
UV



Digitalism

GF1817 W1250mm
Horizontal use
UV

Plain Laminated
GF1715 (P.23)

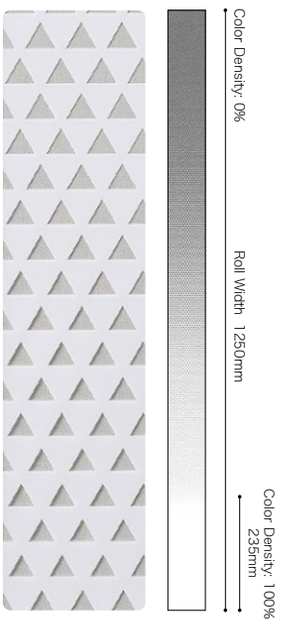


Horizon

GF1703 W1250mm
Horizontal use
UV

*Exterior Use (P.17)

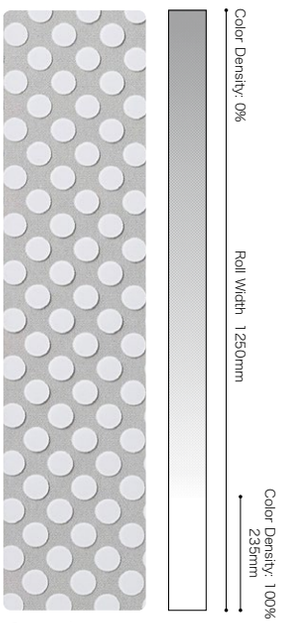
Plain Laminated
GF1715 (P.23)



Kolmio

GF1816 W1250mm
Horizontal use
UV

Plain Laminated
GF1715 (P.23)

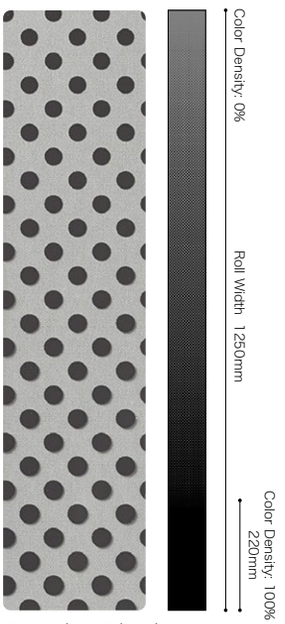


Circular

GF1702 W1250mm
Horizontal use
UV

*Exterior Use (P.17)

Plain Laminated
GF1715 (P.23)



Circular Black

GF1818 W1250mm
Horizontal use
UV

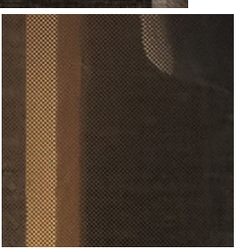
Gradation

* Due to the characteristics of Digitalism (GF1817), Horizon (GF1703), Kolmio (GF1816), and Circular (GF1702), the printed layer may peel off when exposed to scratches, abrasion, alcohol-based cleaners, or other external factors. Please handle with care.
* For side-gradient products, a full-pattern version is available for each design. However, please note that color variations may occur due to differences between production lots.

Center Gradation

Neo Grain 600 ／ **GF1906** (Horizontal use)

Circular Frost ／ **GF1862**

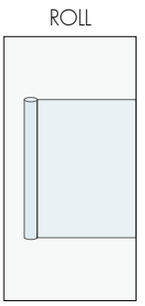


Enlarged View of Dot Gradient Section

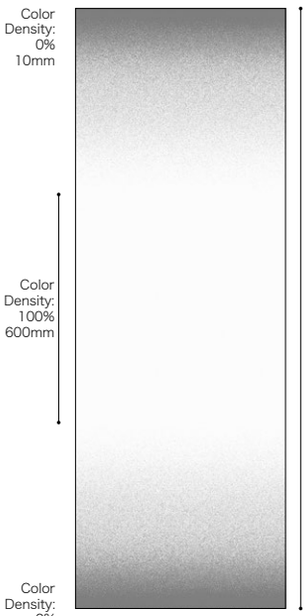
Shatter-Resistance UV Protection Insect Repellence Hard Coating

Neo Grain

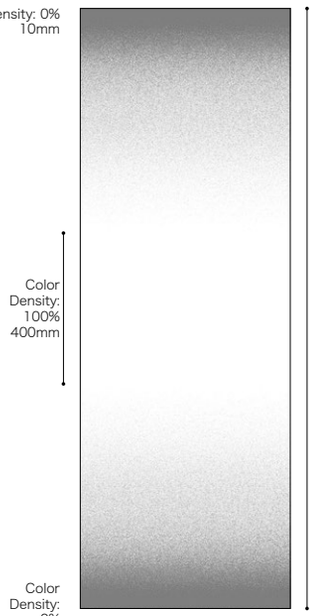
Center Gradation Film – Width 1550mm
Designed for horizontal applications on glass partitions.
Available in two versions: 600mm solid center section and 400mm solid center section (100% color density)



Applied horizontally at
the center of the glass



Neo Grain 600 NEW
GF1906 W1550mm
Horizontal use

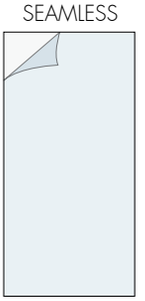


Neo Grain 400 NEW
GF1904 W1550mm
Horizontal use

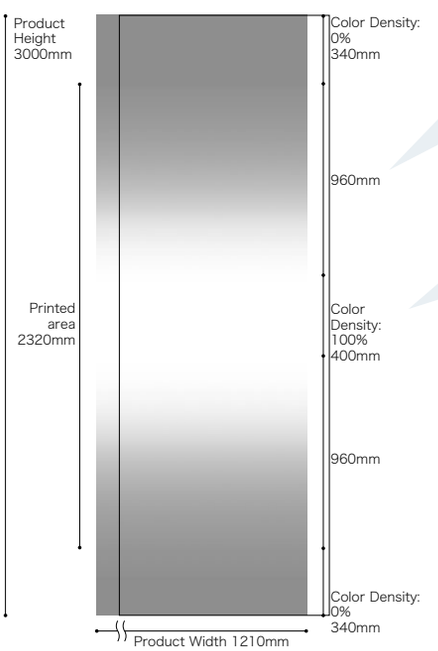
Circular Frost

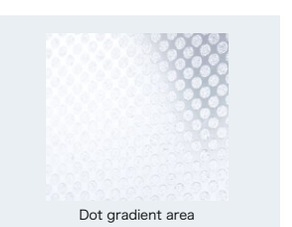
Center Dot Gradation Film – W1210mm × H3000mm
This seamless film covers the full glass surface, including the transparent top and bottom areas, ensuring the film edges remain virtually invisible.

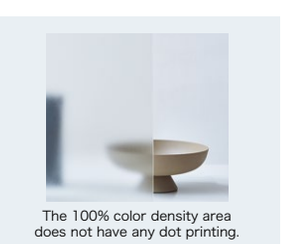
*Sample is taken from the dot gradient section



Applied to the entire
glass surface







Circular Frost
GF1862 W1210mm×H3000mm Sold by sheet

*Circular Frost (GF1862) is produced using inkjet printing, so slight color variation may occur between sheets. Joint installation is not recommended.

Fog

GOOD DESIGN

Mist-like, Naturally Transparent Gradient Film

Fog 2000 / **GF1854**

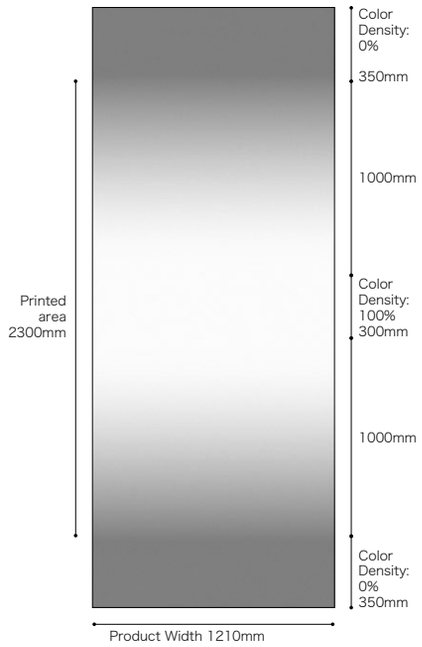
Aisle Side Fog 1500S / **GF1861**
Stairs Side High Graphica (Custom Order / Inkjet)

GOOD DESIGN

Shatter-Resistance UV UV Protection Insect Repellence

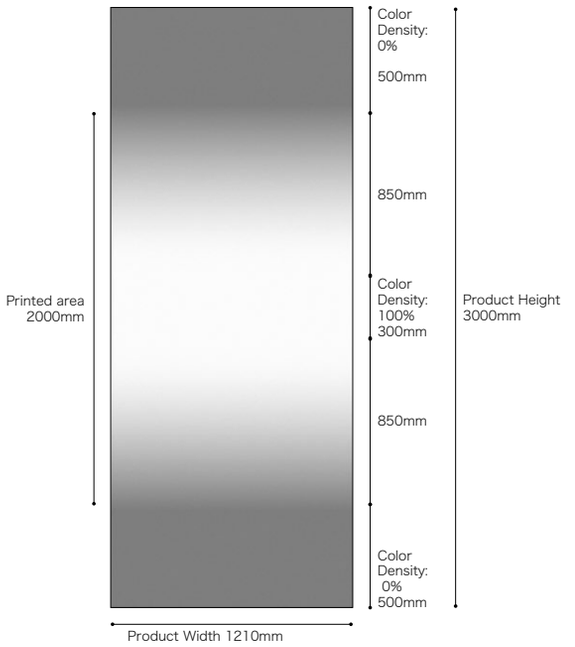
Fog Center Gradation

Fog Center Gradation Film – W1210mm × H3000mm
This seamless film covers the full glass surface, including the transparent top and bottom areas, ensuring the film edges remain virtually invisible.



Fog 2300

GF1853 W1210mm×H3000mm Sold by sheet

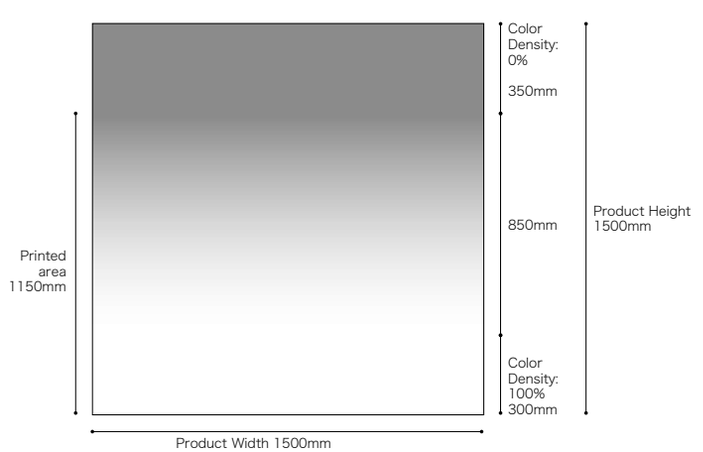


Fog 2000

GF1854 W1210mm×H3000mm Sold by sheet

Fog Side Gradation

Fog Side Gradation Film – W1500mm × H1500mm
Perfect for use on railing glass, especially in locations where privacy from below is important.



Fog 1500S

GF1861 W1500mm×H1500mm Sold by sheet

Fog Sample

For Fog products, color density of 100% area will be provided as a sample.

Applied to the entire glass surface

*Fog is produced using inkjet printing, so slight color variation may occur between sheets. Joint installation is not recommended.

Fog Custom Idea

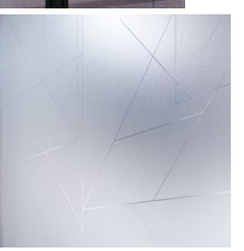
Inkjet technology enable to make customize freely. Following are just few of the ideas.

Idea 1 Adjusting the gradient size

Idea 2 Changing the colors

Idea 3 Combining with logos or signage

Idea 4 Integrating with patterns



Pattern Detail

* The examples shown above are designs created using inkjet printing.
* For more details, please contact our sales office.

Design Film

Stone / Rust

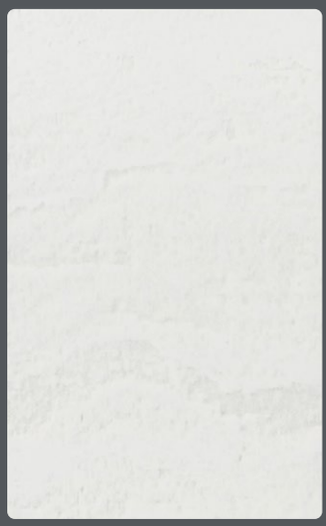
Shiny Onyx / **GF1864**

Shatter-Resistance UV UV Protection Insect Repellence Hard Coating

Shiny Onyx
GF1864 W1250mm

Iron Rust
GF1866 W1250mm

Shiny Marble
GF1863 W1250mm



Marble
GF1802 W1250mm

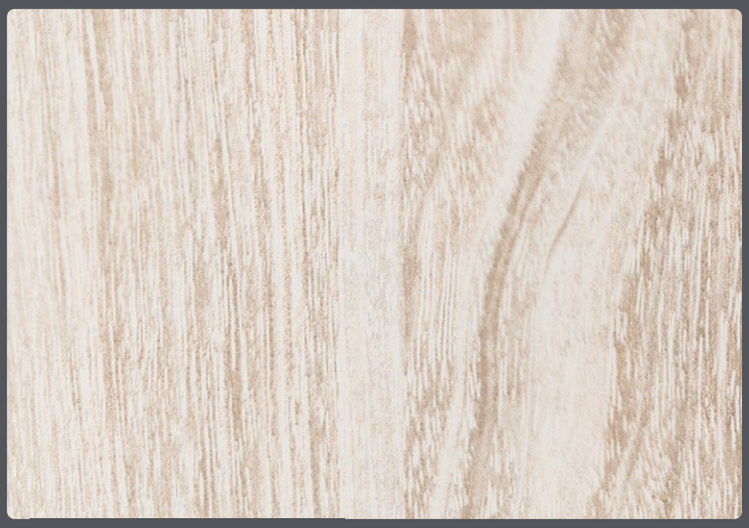
Marble / **GF1802**

Iron Rust / **GF1866**

Wood / Fabric

Bronze Pearl Wood / **GF1865**

Shatter-Resistance UV UV Protection Insect Repellence Hard Coating



Bronze Pearl Wood
GF1865 W1250mm

Clear Wood
GF1803 W1250mm

Lanka
GF1869 W1250mm

Liina
GF1804 W1250mm

Neuloa
GF1870 W1250mm

Chenille Silver
GF1867 W1250mm

Chenille Brown
GF1868 W1250mm

Risti
GF1737 W1250mm

Clear Wood / **GF1803**

Lanka / **GF1869**

Stripes / Geometric

Sade / **GF1871**

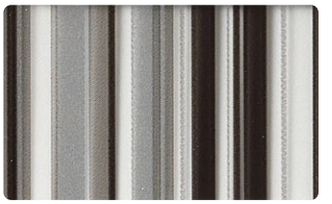
Lokki / **GF1833**

Polaris
GF1723 W1250mm

Joki
GF1826 W1250mm

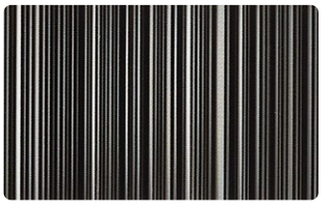
Nagisa
GF1730 W1250mm

Kitara
GF1827 W1250mm



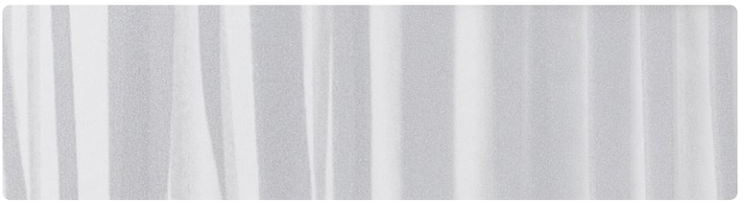
Kitara Black
GF1828 W1250mm

Runo
GF1824 W1250mm



Runo Black
GF1825 W1250mm

Sade
GF1871 W1250mm



Sade Silver
GF1872 W1250mm

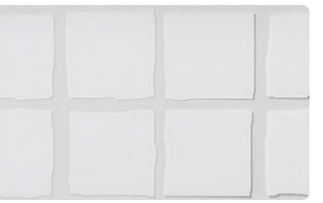
Triangle
GF1831 W1250mm

Triangle Silver
GF1830 W1250mm

Lumi
GF1832 W1250mm

Lokki
GF1833 W1250mm

Cubic
GF1835 W1250mm



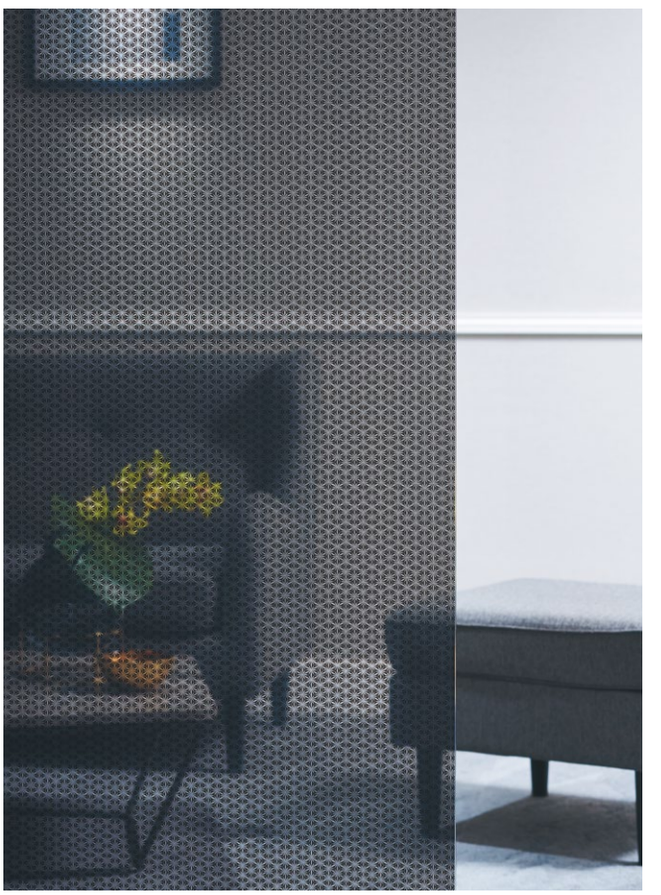
Ethico R **NEW**
GF1911 W1000mm

* Due to the characteristics of (GF1826) and Lokki (GF1833), the printed layer may peel off when exposed to scratches, abrasion, alcohol-based cleaners, or other external factors. Please handle with care.
* Installing Ethico R (GF1911) with joints may create gentle shifts in the pattern.

Japanese

Shiraginu / **GF1836**

Kozue / **GF1748**

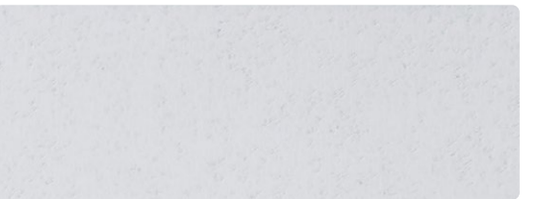


Asanoha kuro kiriko / **GF1838**

Shiraginu
GF1836 W1250mm

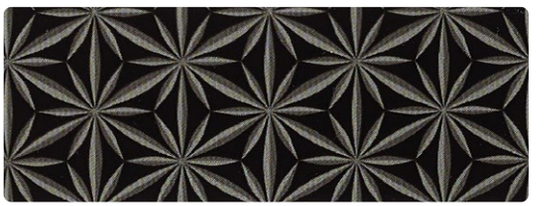
Unryu
GF1747 W1250mm

Kozue
GF1748 W1250mm



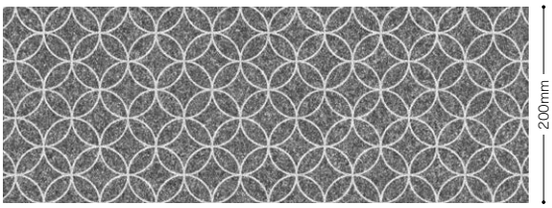
Shirotae
GF1746 W1250mm

Asanoha kiriko
GF1837 W1250mm



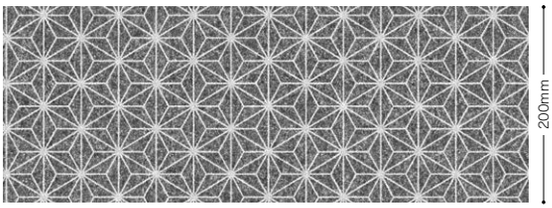
Asanoha kuro kiriko
GF1838 W1250mm

Shippo kumohada
GF1750 W930mm



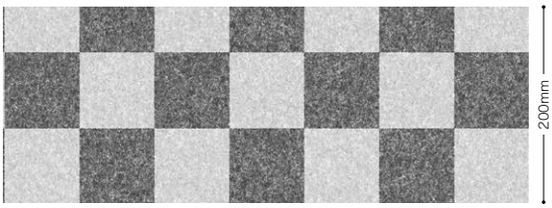
Shippo kumohada ／ **GF1750**

Asanoha kumohada
GF1752 W930mm



Asanoha kumohada ／ **GF1752**

Ichimatsu kumohada
GF1753 W930mm



Ichimatsu kumohada ／ **GF1753**

Playful Pattern & Gradation

Repose / **GF1873**

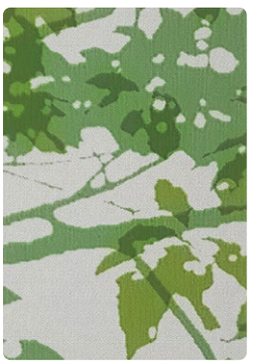
Poetry R / **GF1913** (Horizontal Use)

Nord R / **GF1914** (Horizontal Use)

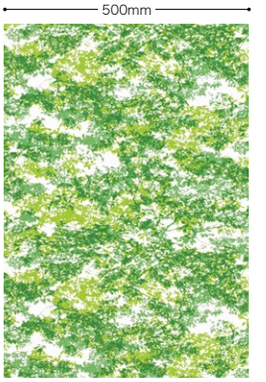
Pop Ethico R / **GF1912** (Horizontal Use)
Ethico R / **GF1911** (Horizontal Use) (P.37)

Pattern

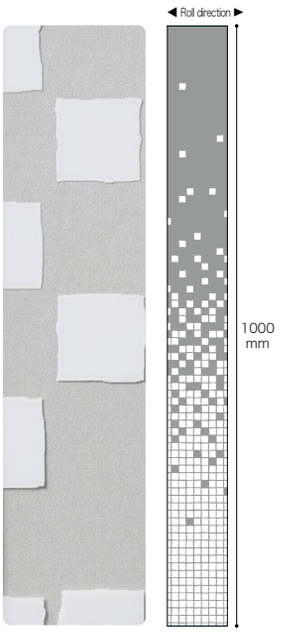
Repose
GF1873 W1250mm



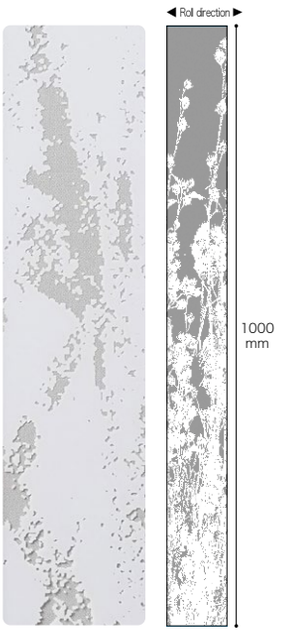
Kodachi
GF1761 W930mm



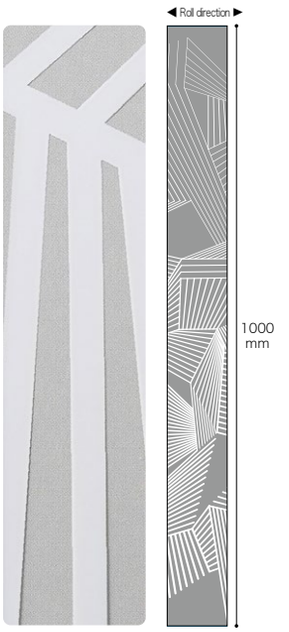
Gradation



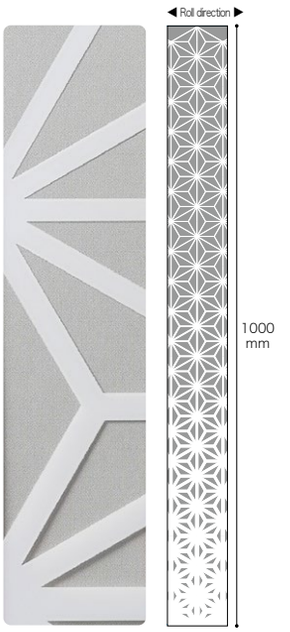
Pop Ethico R **NEW**
GF1912 W1000mm
Horizontal Use



Poetry R **NEW**
GF1913 W1000mm
Horizontal Use



Nord R **NEW**
GF1914 W1000mm
Horizontal Use



Asanoha R **NEW**
GF1915 W1000mm
Horizontal Use

Ethico R **NEW**
GF1911 (P.37)

* Installing Pop Ethico R (GF1912) or Ethico R (GF1911) with joints may create gentle shifts in the pattern.Additionally. color variations may be present between different production lots.

Textured Glass

River ／GF1874

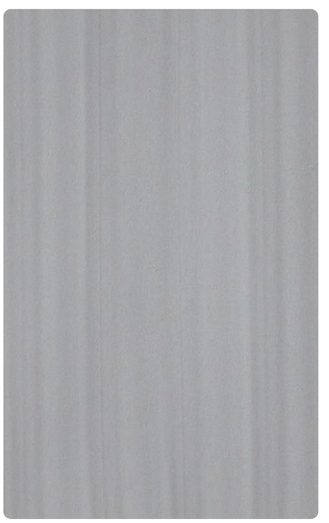
Front side of glass: Antique ／GF1809
Back side of glass: Mirage ／ GF1822 (P.11)

Antique
GF1809 W950mm

Vertical
GF1806 W950mm

River
GF1874 W950mm

Antique Gray
GF1811 W950mm



Vertical Gray
GF1808 W950mm

Retro
GF1720 W950mm

Norm
GF1812 W950mm

Kangas
GF1813 W920mm

Retro White
GF1721 W950mm

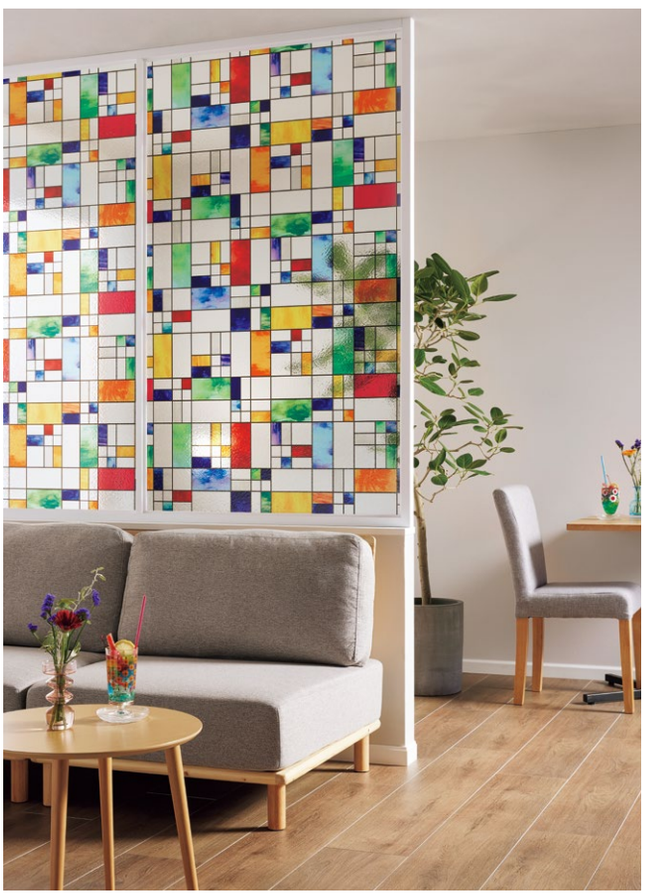
* Please note that due to the nature of the products listed on p.43, fine air bubbles may remain after installation.
Additionally, at low temperatures, moisture and air bubbles may not dissipate properly during installation, which could affect the final appearance.
To ensure optimal results, make sure the installation environment is properly prepared. For more information, please refer to the separate booklet.

Effect / Stained Glass

Gemstone / **GF1876**
Vertical / **GF1806** (P.43)

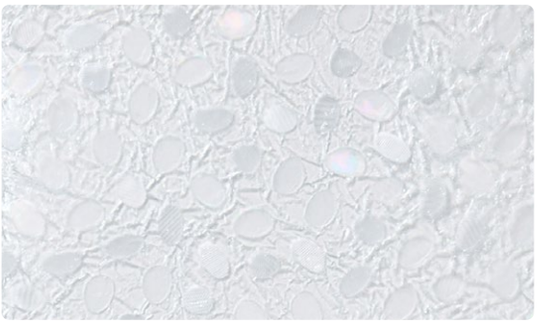
Aurora / **GF1875**

Slim Block / **GF1877**



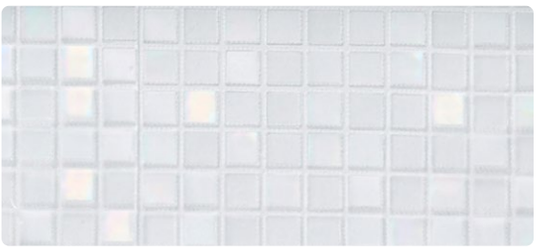
Colorful Tile / **GF1878**

Effect

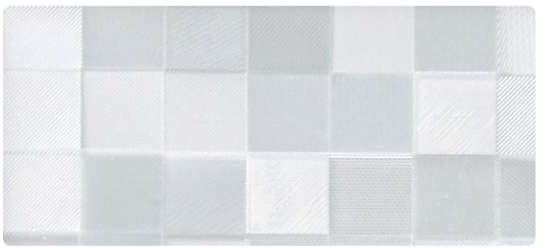


Gemstone
GF1876 W950mm

Aurora
GF1875 W950mm
The film creates a prismatic effect as light passes through it.



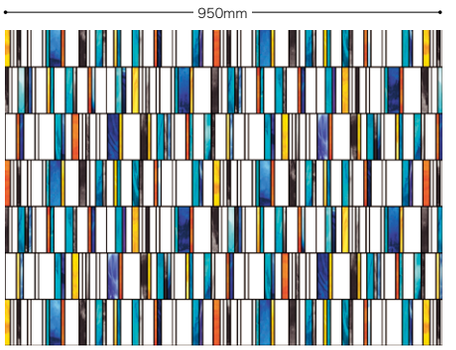
Fantasy
GF1740 W950mm
The film creates a prismatic effect as light passes through it.



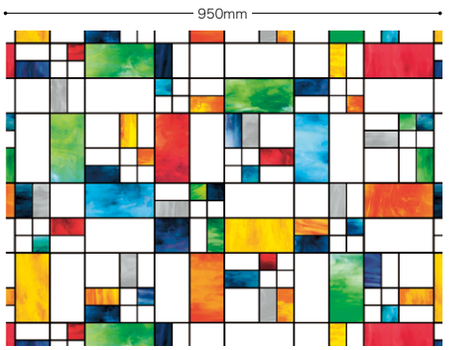
Mosaic Cube
GF1741 W950mm

Stained Glass

Slim Block
GF1877 W950mm



Colorful Tile
GF1878 W950mm



* Please note that, because of the pattern characteristics of Mosaic Cube (GF1741), horizontal lines may appear.
* Fine air bubbles may also remain after installation, as a result of the material properties of Slim Block (GF1877) and Colorful Tile (GF1878).
Additionally, at low temperatures, moisture and air bubbles may not dissipate properly during installation, which could affect the final appearance.
To ensure optimal results, make sure the installation environment is properly prepared. For more information, please refer to the separate booklet.

HIGH GRAFICA

Digital Print Library

Made-to-Order Products

This collection features custom-made glass film designs, crafted using digital printing technology.
Each design can be customized in size, color, and ink type.

- Various Design Patterns
- Customizable Sizes
- Customizable Colors
- Customizable Inks

ABSTRACT NATURE

for **CLEAS**

"Abstract Nature" is a design series that subtly weaves the essence of nature into spaces, drawing on themes that naturally harmonize with architectural elements such as water and light.
"Abstract Nature for CLEAS" features nature-inspired forms, leveraging the unique properties of glass film to evoke transparency and depth.

HZC0001 Frosted Color

Hidamari The ease of soft, glowing light

HZC0002 Frosted Clear

Soyokaze The quiet breeze over open fields

HZC0003 Frosted Clear

Suiren The stillness of flowing water

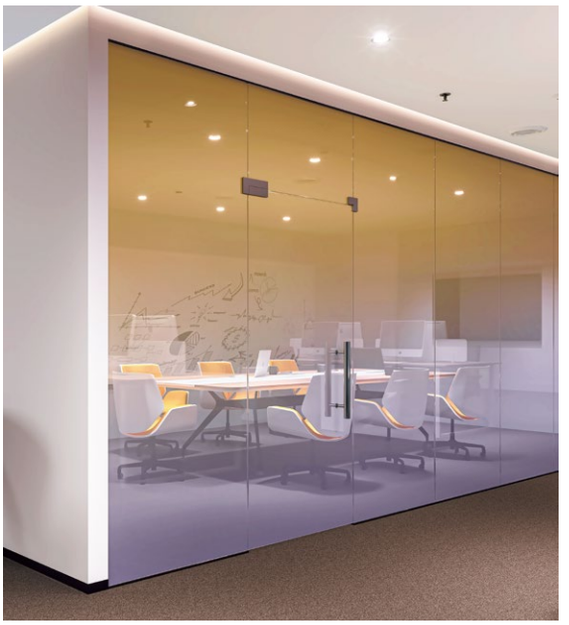
HZC0004 Standard White

Watakumo The scene gently shifting

HZC0005 Frosted Color

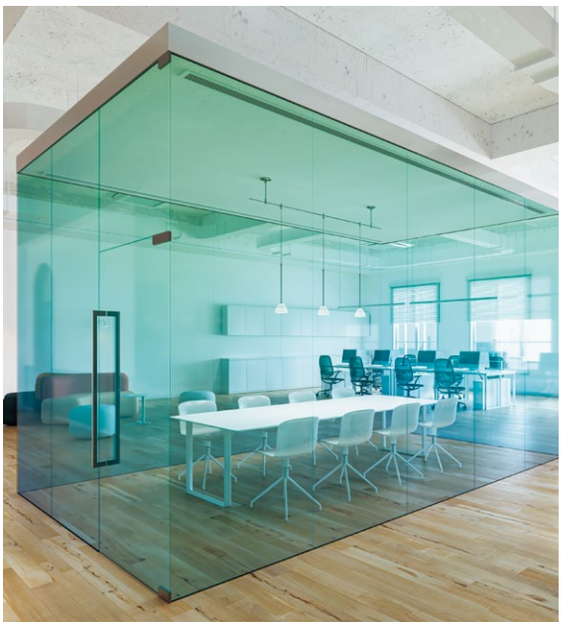
Utakata The Waves in quiet drift

HZC0101 Candy Line Standard White Color



HZC0102 Sunset Gradient Standard Color

HZC0103 Jelly Jelly Beans Standard White Color



HZC0104 Lake Gradient Standard Color

HZC0105 Diamond Blind Frosted Color

HZC0201 Big Letters Standard White

HZC0202 Classic Ornament Frosted White

HZC0203 Many Letters Frosted Clear

HZC0204 Smoking Cloud Frosted White

HZC0205 Joyful Neon Standard White Color

GRAPHIC / PATTERN

HZC0301 White Wind Standard White

HZC0302 Random Brick Standard White

HZC0303 Random Xylophone Frosted Clear

HZC0304 Composition Trill Standard White

HZC0305 Prism Tile Standard White

HZC0306 Seamless Textile Frosted Color

HZC0307 Blush Line Frosted Clear

HZC0308 Shower Line Frosted Clear

HZC0309 Technology Line Frosted Color

HZC0310 Strata Border Frosted Clear

HZC0311 Neuro Line Frosted Color

HZC0312 ARARE(Large) Standard White

HZC0313 ARARE(Small) Standard White

HZC0314 Rhythmic Composition Standard White

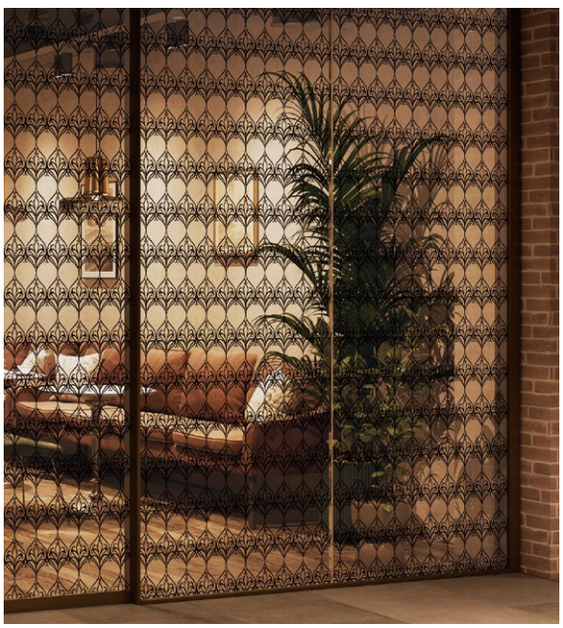
HZC0315 Simple Wave Pattern Frosted Clear

HZC0316 Pictogram Ensemble Standard White

HZC0317 Continuous Baum Frosted Clear

HZC0318 Surf Wave Standard White

HZC0319 Drawing Rope Frosted White

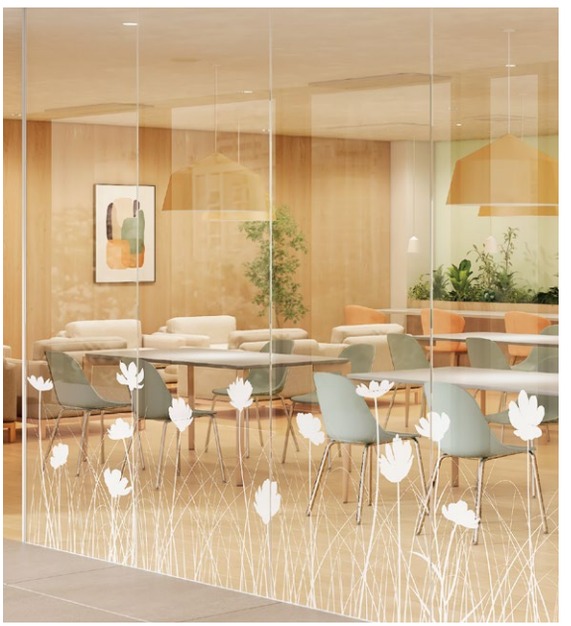


HZC0320 NOUVEAU DAMASK Standard Color

HZC0321 Polygon Tree Standard White Color

ILLUSTRATION

HZC0401 Ivy Curtain Frosted Color



HZC0402 Field Blossom Standard White

HZC0403 Forest Friends Standard White

HZC0404 Full-Feet Tall Grass Frosted Color

HZC0405 Tree and Animal Frosted Clear

HZC0406 Pleasure Land Frosted Color

HZC0407 Bouncy Fruit Kitchen Standard White Color

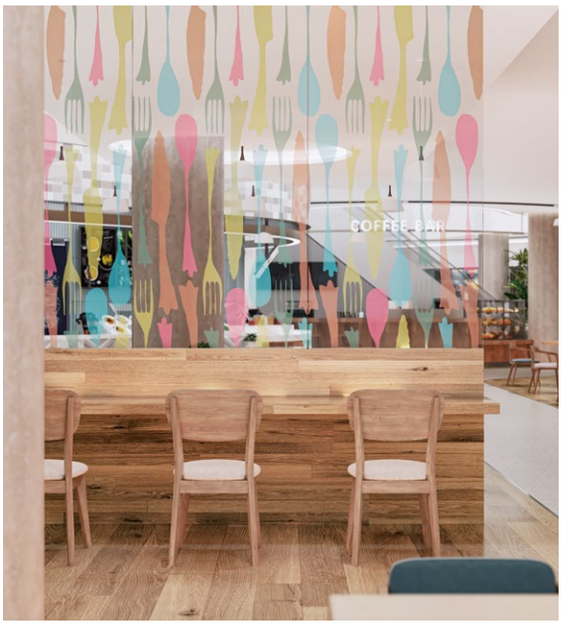
HZC0408 Forest Hide-and-Seek Creatures Standard White

HZC0409 Cactus Shadow Standard Color

HZC0410 Fairy-Tale Rainbow Frosted Color

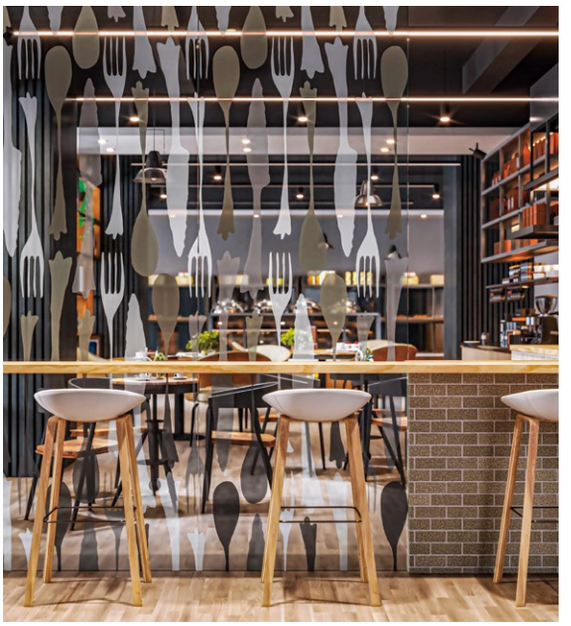
ILLUSTRATION

HZC0411 Dream Flower Standard White Color



HZC0412 Pop Cutlery Standard Color

HZC0413 Labyrinth Town Standard White



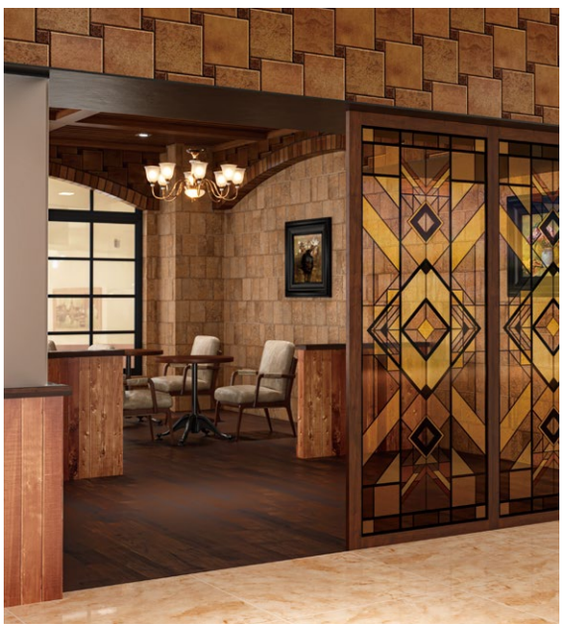
HZC0414 Monotone Cutlery Standard White Color

HZC0415 Skyscraper Standard White

HZC0416 Carol (Stained Glass Style) Standard White Color

HZC0417 Yummy Vegetables Standard White

HZC0418 C'est très bon! Standard White



HZC0419 Lighthouse (Stained Glass Style) Standard White Color

HZC0420 Blossom River Standard White Color

Order Flow

We offer design proposals tailored to your project, drawing from our Digital Print Library collections - including Contours of Nature for CLEAS, COLOR, SIGN, GRAPHIC/PATTERN, and ILLUSTRATION - and supported by a wide range of real installation case studies.
For further information, feel free to contact our sales office.

* Images shown are for illustrative purposes only and may differ from the final product.

Design Selection
Product Number Example:

Site Measurement
* The design will be adjusted to match the required dimensions.

Customization Based on Product Specifications
Color Selection | Ink Selection
* The finish will match the sample images designated for each product number.

Sample/Layout Drawing Creation & Approval
* Delivery will be made within 1–2 weeks of your request.

Final Design Confirmation Production & Delivery
* Delivery will be made within 1–3 weeks of your order.

* Delivery times are estimates and may vary. Confirm the schedule at the time of order.

Color Selection

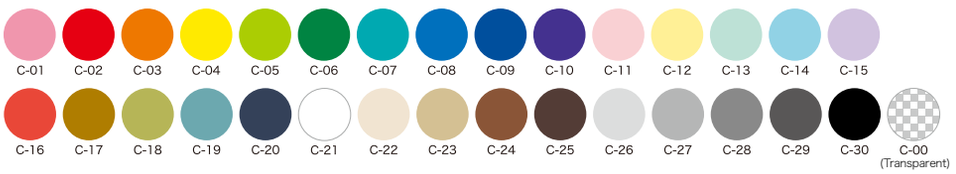
You can choose colors from the C-01 to C-30 color range.
For other color requests, please include a color chip (sample) with your instructions.

HZC0309 Frosted Color C-08

Color Change Image

Frosted Color C-10

Color for ink jet



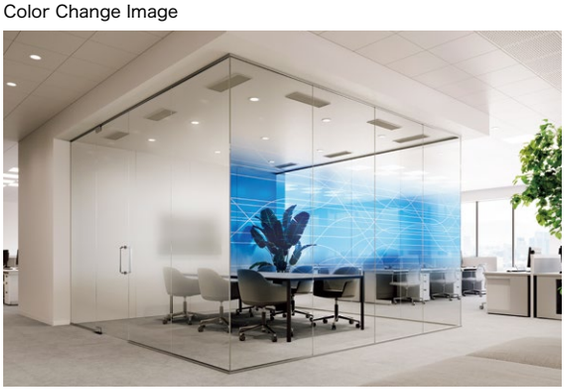
* The base color of the glass film is transparent. If you would like to specify a base color, please select C-00 (transparent).
* Pale colors cannot be reproduced on glass film.
* Color appearance may vary depending on the type of ink used.
* Please note that gold and silver cannot be reproduced with digital printing.

Ink Selection

Please choose between frosted ink (with opacity) and standard solvent ink (with transparency).
Note: The standard width of the base material differs between frost ink and standard solvent ink.

HZC0309 Frosted Color C-08

Color Change Image



Standard Color C-08

Frosted Ink

Base: PET Substrate
Standard Width: 1200 mm / 1500 mm

Single-layer Ink Process

Frosted Clear

Ideal for achieving a matte finish with high opacity, making it suitable for privacy applications.
Can be combined with frosted colors for enhanced effect.

Single-layer Ink Process

Frosted Color

Offers a matte finish and high opacity, perfect for privacy applications that require both function and color.
Also compatible with frosted clear ink for added design flexibility.

Double-layer Ink Process

Frosted White

Combines frosted clear ink and white ink in a double-layer process.
Enables sign graphics with cut-out lettering effects and smooth gradients, all on a single film.

Standard Solvent Ink

Base: PET Substrate (Laminated Type)
Standard Width: 1200 mm

Single-layer Ink Process

Standard White

Ideal for creating vivid color effects, even with transparent layers.
Increasing the density of the Standard White ink boosts its opacity, making it more suitable for base layers or highlights.
It can also be mixed with Standard Color inks.
When used this way, the blend is referred to as Standard White Color.

Single-layer Ink Process

Standard Color

Ideal for achieving subtle, transparent color effects.
When combined with Standard White, the result is known as Standard White Color.

Double-layer Ink Process

Standard White Color

By layering Standard Color ink over Standard White ink, this method achieves highly opaque color expression.
This double-layer ink process creates different appearances on the front and back sides of the glass.
Installation side: Front (Colored) / Back (White)

* For a three-layer ink process that provides the same color appearance on both sides, please contact our sales office.

Underlayer Film

Used as a base layer when applying film to resin panels where post-installation gas emission may occur.

BB-348

●Size:1370 mm width × 7 m roll (sold per roll)
●Material:PET

Application
Installation should be carried out using the water application method, as with standard glass films.

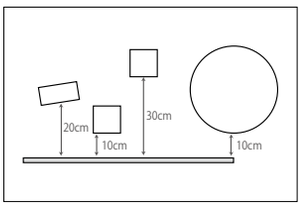
Recommended Substrate Materials
Polycarbonate board・Acrylic board・ABS resin board・Polystyrene board

Notes
The amount of outgassing from the substrate may vary depending on the usage environment.
Avoid applying the film to resin boards that are exposed to direct sunlight or intended for outdoor use.
Swelling or peeling may occur and cannot be completely prevented under any conditions.
Due to the nature of the product, the underlayer film cannot be removed once installed. Please be aware of this in advance.
Ensure that the underlayer film is firmly adhered to the substrate before installing the top film.
The adhesion between the top film and the underlayer film will depend on the adhesive strength of the top film.
Avoid using top films composed entirely of PVC as the base material.

Transmittance / Reflectance

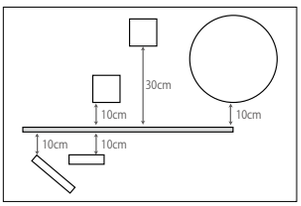
Transmittance

Mirror 40
GF1106



Reflectance

Mirror 40
GF1106



Function Description

Solar Radiation ····· Refers to the spectrum of light emitted by the sun that reaches the Earth's surface, spanning wavelengths from 300 to 2500 nm.

Visible Light ····· The portion of solar radiation visible to the human eye, commonly referred to as “light” or “visible light” (wavelengths: 380–780 nm).

Ultraviolet Radiation ····· Part of solar radiation that includes UV-B (300–315 nm) and UV-A (315–380 nm) wavelengths, as defined by JIS A 5759.

Shading Coefficient ····· Indicates the effectiveness of solar heat blocking. A lower value means better performance and greater energy-saving benefits in summer. The standard reference value is 1.0 for uncoated float glass.

Solar Heat Gain Coefficient ····· The proportion of solar heat that enters a room, including both the heat transmitted directly through the glass and the portion absorbed and re-radiated indoors.

Thermal Transmittance ····· Measures how easily heat passes through a material due to temperature differences between inside and outside. Lower values indicate better insulation and higher energy efficiency in winter. Units: W/m²K.

Impact Destruction Test ····· Simulates breakage caused by accidental impact from people or objects. Conducted by striking the glass with a weighted object.

Interlayer Displacement Test ····· Simulates breakage caused by building distortion, such as during an earthquake. Conducted by distorting the window frame.

Missile Collision Test ····· Simulates breakage from flying debris during strong winds or typhoons. Conducted by launching a steel ball at the glass.

High-Range UV Protection ····· Products that block 99% or more of ultraviolet radiation (280–400 nm) from sunlight.

Green Purchasing Law-Compliant Products
····· Products meeting the following criteria: Shading coefficient below 0.7, Visible light transmittance of 10% or higher, Thermal transmittance below 5.9 W/m²·K
Note: For products with visible light transmittance of 70% or higher, the shading coefficient must be below 0.8.

How to Choose Glass Films

Select by Glass Type × Desired Functionality

Glass Performance Level

High

	Shatter-Resistance UV Protection	Shatter-Resistance UV Protection Heat Rejection	Shatter-Resistance UV Protection Heat Rejection Thermal Insulation
Float Glass Standard clear flat glass.	Clear Shatter-resistant Film Chiaro 90 Safety Film Toughbarrier 90 High-range UV Protection Film Unfade 90	Multi-layer PET Heat Rejection Gene HR 80 High-range UV Protection & Heat Rejection Shinra HR 90 High Transparency Heat Rejection Lucent 90 Clear Heat Rejection Core 70	Low-E (Low Emissivity) Ecorim 70
Patterned & Frosted Glass Glass with one surface embossed with a finely textured pattern.	Patterned & Frosted Glass Film Free Fit III	Patterned & Frosted Glass Film Free Fit III Pearl	
Insulating Glass (Double-Glazed) Glass consisting of two panes separated by an air layer to enhance thermal insulation.	Clear Shatter-resistant Film Chiaro 90 Safety Film Toughbarrier 90 High-range UV Protection Film Unfade 90	Multi-layer PET Heat Rejection Gene HR 80 High-range UV Protection & Heat Rejection Shinra HR 90 High Transparency Heat Rejection Lucent 90 Clear Heat Rejection Core 70	○
Low-E Insulating Glass Glass coated with a special low-emissivity (Low-E) metallic layer that offers excellent thermal insulation, effective heat rejection, and strong resistance to condensation.	Clear Shatter-resistant Film Chiaro 90 Safety Film Toughbarrier 90 High-range UV Protection Film Unfade 90	●	●

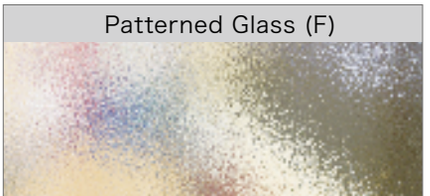
* ○ : Insulating (Double-Glazed) Glass provides thermal insulation to enhance heating efficiency in winter.
* ● : Low-E Insulating Glass offers both thermal insulation and heat rejection for year-round energy efficiency.
* Heat Rejection: Improves cooling efficiency in summer
  Thermal Insulation: Improves heating efficiency in winter

Glass Types

Float Glass (FL)

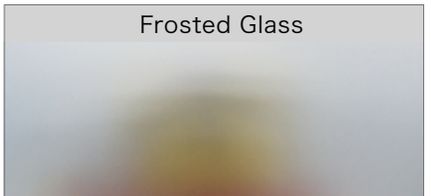
The most commonly used type of glass, float glass is transparent with a flat, smooth surface. All types of glass films can be applied to float glass.

Patterned Glass (F)



Patterned glass features a textured surface on one side, with styles such as KASUMI (frosted) and NASHIJI (pebbled). Since the textured side faces the interior, only the “Free Fit III” film is compatible.

Frosted Glass



This is transparent glass that has been surface-treated to create fine scratches on one side, making it opaque. Only the “Free Fit III” film for frosted glass can be applied.

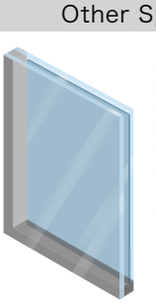
Wired Glass (PW)

Also called fire-resistant or fire-protection glass, this type contains an embedded steel wire mesh. Structurally, it is about 60% as strong as float glass. Avoid using highly solar-absorptive films, as they may cause thermal cracking.

Insulating (Pair) Glass

Composed of two or more layers—typically arranged as outer glass + air layer + inner glass—insulating glass may be prone to thermal cracking depending on its configuration.

Other Specialty Glass



Specialty glasses like heat-reflective glass, heat-absorbing glass, and Low-E insulating glass may not be compatible with certain film types. Film application is generally not recommended for these types.

* Please do not apply film to vacuum-insulated glass.

Icon Descriptions

- Shatter-Resistance ··· Complies with JIS A 5759 Shatter-resistant Performance Test Methods A (Impact Destruction Test) and B (Interlayer Displacement Test), helping to reduce the risk of secondary injury from broken glass.
- UV Protection ····· Blocks 99% or more of ultraviolet rays in the 300–380 nm wavelength range, as defined by JIS A 5759.
- Insect Repellence ····· Helps reduce the attraction of insects that are drawn to ultraviolet light (phototaxis).
- Hard Coating ····· A tough resin coating protects the surface from scratches caused by cleaning or everyday contact.
- Heat Rejection ····· Blocks infrared rays to reduce heat transfer, enhancing indoor comfort and energy efficiency—especially during summer.
- Low Iridescence····· Designed to minimize visible iridescence (optical interference patterns).
- Exterior Use ····· Suitable for installation on surfaces exposed to the outdoors.
- Low-E ····· Provides high transparency while blocking external heat in summer and retaining indoor warmth in winter, supporting energy efficiency year-round.
- Reverse Installation ··· For optimal performance, reverse installation is recommended when combining this product with others.

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Check the product number for the listing page.

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sangetsu | SUSTAINABLE DEVELOPMENT GOALS

Sangetsu supports
the Sustainable Development Goals (SDGs).

The Sustainable Development Goals (SDGs) are a set of international objectives established by the United Nations to achieve a sustainable world by 2030.

Our Specific Initiatives

Sustainable Cities and Communities

Glass films provide functions such as shatter resistance and heat rejection, helping to maintain a safe and comfortable living environment.

Responsible Consumption and Production

By using recycled materials from PET bottles, we help promote a circular society.

Climate Action

Low-emissivity film blocks external heat in summer and retains indoor warmth in winter, helping to reduce energy consumption.

About This Sample Book

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CLEAS Glass Film