



bipv korea

**Building
Integrated
Photovoltaic
System**



CIGS Power Glass

BEAUTIFULLY SUSTAINABLE

WHAT IS BiPV

While traditional solar panels usually don't provide any actual structural function to the buildings they're installed on, **BiPV** does. At its core, **BiPV** is categorized as a dual-purpose solar product, both generating solar electricity and working as an integrated structural part of a building.

Today, most **BiPV** products are designed for large commercial buildings, like an apartment complex or community center, however, there's a growing demand for residential homes that wish to retain their aesthetics.


ADVANTAGES

The obvious benefit of BiPV, it's another way to generate free energy from the sun. Enough solar energy is continually hitting Earth to power our entire planet 10,000 x over, so every extra inch of that surface we can use to generate electricity is a plus.

Aside from solar energy production, the aesthetics of BiPV are a big draw. While some people dislike the noticeable look of traditional solar panels on buildings, BiPV offers a subtler, sleeker way to go solar. For commercial and industrial buildings, BiPV is also a way to showcase a company's or organization's innovation and environmental awareness.

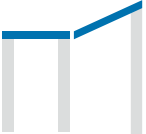


APPLICATIONS




01

Shade design installed in the upper facade of the building




02

Roof Integrated Form in Roof Daylighting Window




03

The form of a roof that is installed on a building's roof




04

Architectural finish form fitted and coupled to steel structures



05

Design installed in the parking lot of the building



06

Wall-integrated wall shape (translucent or opaque)

CIGS Power Glass



STANDARD SERIES

Modest and decent
Good power
generation



COLORED SERIES

Various and
customized



STONE IMITATION SERIES

Subtle and steady
Nature-friendly



TRANSPARENT SERIES

Lively and good-looking
Neat and elegant



TRIPPLE GLASS SERIES

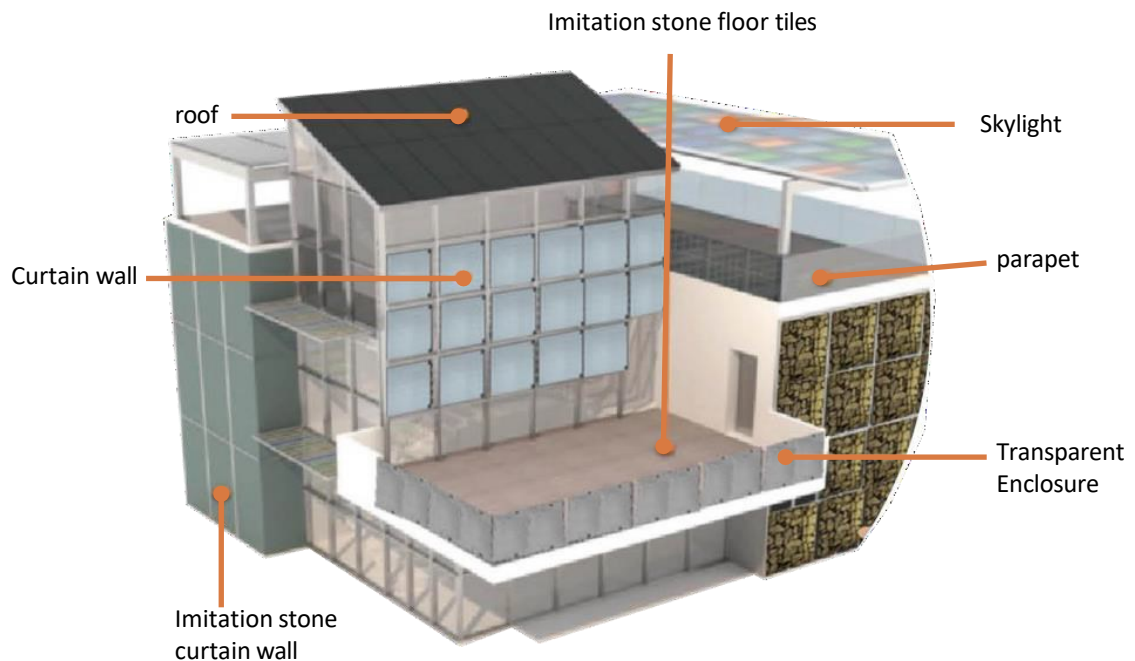
Windproof and pressure
resistant safe and
reliable



HOLLOW SERIES

Energy-saving and
heat-preserved
Sound Insulating and noise
reduction





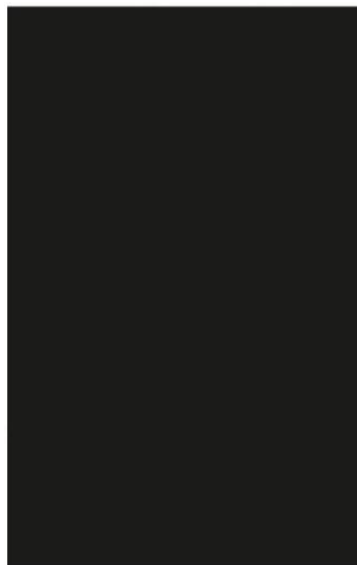
7 Advantages

- Low power temperature coefficient, more advantageous for power generation in humid and hot weather
- Passed the highest fire rating: Class A
- Rich in colors, available in over 300 different colors
- 0~60% adjustable transparency
- Hollow design for thermal insulation and noise reduction
- Green, Environment-friendly, safe, non-toxic release
- Maximum size of domestic single chip, 1.92m²
- Suitable for BIPV building materials

Standard Series

Modest and decent
Good power
generation

- IEC/EN 61215-2/61730
- DIN V VDE 0126-3, DIN V VDE 0126-5
- Safety level: Class II
- Fire protection class A



| Temperature coefficient | |
|-------------------------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

| Attenuation coefficient | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |

Suitable for household roofs, factory roofs and facades, ground power plants, parking sheds, bus stops, etc.



| Signal-to-transmission coefficient | | | | |
|------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Model | CIGS-TF-135W(*) | CIGS-TF-140W(*) | CIGS-TF-145W(*) | CIGS-TF-150W(*) |
| Pmax(W) | 135 | 140 | 145 | 150 |
| Power tolerance(%) | -0/+5 | -0/+5 | -0/+5 | -0/+5 |
| Vmpp(V) | 57.83 | 59.79 | 61.76 | 63.72 |
| Imp(A) | 2.34 | 2.34 | 2.35 | 2.36 |
| Voc(V) | 76.90 | 78.35 | 79.79 | 81.24 |
| Isc(A) | 2.62 | 2.63 | 2.64 | 2.64 |
| Component efficiency(%) | 12.8 | 13.3 | 13.7 | 14.2 |

| Operation parameters | |
|-------------------------------------|-------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | 4.0A |
| Operation temperature | -40°C~+85°C |
| Maximum static load | 3600Pa |
| Hail test | 2400 |
| Protection grade | pass |
| Maximum System Voltage | IP67 |

| Mechanical parameters | |
|-----------------------|---|
| Glass Size | 1587mm*664mm |
| Glass Thickness | 5.8mm |
| Thickness of product | 18.8mm(Including junction box thickness, Split rear junction box) |
| Square Measure | 1.05m ² |
| Weight | 17kg |
| Junction box | Split connection |
| Structure | 3.2mm Ultra-white tempered glass+EVA/POE/PVB+2.1mm power generation glass |
| Backtrack | hot dip galvanized sheet |

(*) Representing actual production place



Colored Series

Various and
customized

- IEC/EN 61215-2/61730
- DIN V VDE 0126-3, DIN V VDE V 0126-5
- Safety level: Class II
- Fire protection class A



| Temperature coefficient | |
|-------------------------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

| Attenuation coefficient | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |

Suitable for building facades, corridors, observation platforms, anti slip floors, etc., with various colors.



Signal-to-transmission coefficient

| Model CIGS-TG(*) | | | | |
|------------------|-----------|---------------|--------------|----------|
| Colors | China red | Sunshine gold | Forest green | Sky blue |
| Pmax(W) | 90 | 100 | 110 | 120 |
| % | -5/+5 | -5/+5 | -5/+5 | -5/+5 |
| Vmpp(V) | 60 | 60 | 60 | 60 |
| Imp(A) | 1.582 | 1.761 | 1.941 | 2.064 |
| Voc(V) | 76.50 | 76.7 | 76.9 | 77.5 |
| Isc(A) | 1.820 | 2.006 | 2.192 | 2.310 |

STC(Standard test conditions): the amount of irradiation 1000W/m², Battery temperature 25°C, AM(air mass) 1.5

Operation parameters

| | |
|-------------------------------------|-------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | 4.0A |
| Operation temperature | -40°C~+85°C |
| Maximum static load | 3600Pa |
| Hail test | 2400 |
| Protection grade | pass |
| Maximum System Voltage | IP67 |

Mechanical parameters

| | |
|----------------------|---|
| Glass Size | 1587mm*664mm |
| Glass Thickness | 5.8mm |
| Thickness of product | 18.8mm |
| Square Measure | 1.05m ² |
| Weight | 17kg |
| Junction box | Pass |
| Structure | 3.2mm Ultra-white tempered glass+EVA/POE/PVB+2.1mm power generation glass |
| Can choose color | China red, Sunshine gold, sky blue, etc. |

(*) Representing actual production place



Stone Imitation Series

Subtle and steady
Nature-friendly

- IEC/EN 61215-2/61730
- DIN V VDE 0126-3, DIN V VDE 0126-5
- Safety level: Class II
- Fire protection class A



| Temperature coefficient | |
|-------------------------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

| Attenuation coefficient | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |

Specific patterns can be customized



Signal-to-transmission coefficient

| Model | CIGS-TC-100W(*) | CIGS-TC-120W(*) |
|--------------------|-----------------|-----------------|
| Pmax(W) | 100 | 100 |
| Power tolerance(%) | -5/+5 | -5/+5 |
| Vmpp(V) | 60 | 60 |
| Impp(A) | 1.76 | 2.06 |
| Voc(V) | 76.7 | 77.5 |
| Isc(A) | 2.0 | 2.31 |

STC(Standard test conditions): the amount of irradiation 1000W/m², Battery temperature 25°C, AM(air mass) 1.5

Operation parameters

| | |
|-------------------------------------|-------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | 4.0A |
| Operation temperature | -40°C~+85°C |
| Maximum static load | 3600Pa |
| Hail test | 2400 |
| Protection grade | pass |
| Maximum System Voltage | IP67 |

Mechanical parameters

| | |
|----------------------|---|
| Glass Size | 1587mm*664mm |
| Glass Thickness | 5.8mm |
| Thickness of product | 18.8mm |
| Square Measure | 1.05m ² |
| Weight | 17kg |
| Junction box | Pass |
| Structure | 3.2mm Ultra-white tempered glass+EVA/POE/PVB+2.1mm power generation glass |
| Can choose color | China red, Sunshine gold, sky blue, etc. |

(*) Representing actual production place



Transparent Series

Lively and good-looking
Neat and elegant



Temperature coefficient

| | |
|-------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

Attenuation coefficient

| | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |

Suitable for building facades, corridors, observation platforms, anti slip floors, etc., with various colors.



Signal-to-transmission coefficient

| Model | CIGS-TT-105W(*) | CIGS-TT-80W(*) |
|--------------------|-----------------|----------------|
| Transmittance | 20% | 40% |
| Pmax(W) | 105 | 80 |
| Power tolerance(%) | -5/+5 | -5/+5 |
| Vmpp(V) | 61.82 | 61.51 |
| Impp(A) | 1.71 | 1.28 |
| Voc(V) | 78.82 | 78.42 |
| Isc(A) | 2.11 | 1.58 |

Operation parameters

| | |
|-------------------------------------|-------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | 4.0A |
| Operation temperature | -40°C~+85°C |
| Maximum static load | 3600Pa |
| Hail test | 2400 |
| Protection grade | pass |
| Maximum System Voltage | IP67 |

Mechanical parameters

| | |
|----------------------|---|
| Glass Size | 1587mm*664mm |
| Glass Thickness | 5.8mm |
| Thickness of product | 18.8mm |
| Square Measure | 1.05m ² |
| Weight | 17kg |
| Junction box | Pass |
| Structure | 3.2mm Ultra-white tempered glass+EVA/POE/PVB+2.1mm power generation glass |
| Can choose color | China red, Sunshine gold, sky blue, etc. |

(*) Representing actual production place



Tripple Glass Series

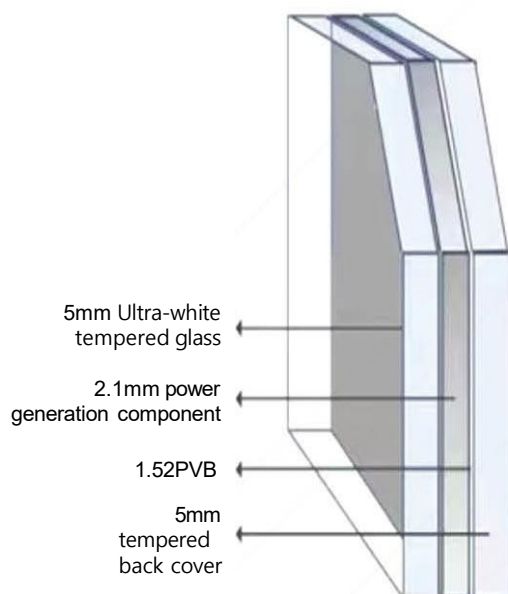
Windproof and pressure resistant, safe and reliable

- IEC/EN 61215-2/61730
- DIN V VDE 0126-3, DIN V VDE 0126-5
- Safely level: Class II
- Fire protection class A



| Temperature coefficient | |
|-------------------------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

| Attenuation coefficient | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |



Glass thickness can be selected according to design requirements, including 5mm, 6mm, 8mm, and 10mm; Can choose different colors, patterns, and light transmittance; Customized sizes can be made according to design requirements. Please contact Kaisheng Photovoltaic professionals.

| Signal-to-transmission coefficient | | | | |
|------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Model | CIGS-TS-120W(*) | CIGS-TS-125W(*) | CIGS-TS-130W(*) | CIGS-TS-135W(*) |
| Pmax(W) | 120 | 125 | 130 | 135 |
| Power tolerance(%) | -5/+5 | -5/+5 | -5/+5 | -5/+5 |
| Vmpp(V) | 56.67 | 58.89 | 61.02 | 63.08 |
| Imp(A) | 2.21 | 2.21 | 2.13 | 2.14 |
| Voc(V) | 75.36 | 77.17 | 78.83 | 80.43 |
| Isc(A) | 2.38 | 2.39 | 2.39 | 2.63 |

| Operation parameters | |
|-------------------------------------|---------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | 4.0A |
| Operation temperature | -40°C ~ +85°C |
| Maximum static load | 5400Pa |
| Hail test | Pass |
| Protection grade | IP67 |

| Mechanical parameters | |
|-----------------------|--|
| Size | 1587mm*664mm |
| Thickness | 13.6mm |
| Square | 1.05m ² |
| Weight | 35Kg |
| Junction Box | Pen type junction box |
| Product Structure | 5mm ultra white tempered +EVA/POE/PVB+2.1mm power generation glass +EVA/POE/PVB+5mm tempered |
| Color Selection | customization |

(*) Representing actual production place



Hollow Series

Energy-saving and
Heat-preserved
Sound Insulating
and noise reduction

- IEC/EN 61215-2/61730
- DIN V VDE 0126-3, DIN V VDE V 0126-5
- Safety level: Class II
- Fire protection class A



| Temperature coefficient | |
|-------------------------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

| Attenuation coefficient | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |



Suitable for building curtain walls, casement windows, daylighting roofs, etc., with adjustable transparency of 0-60%, thermal insulation, sound insulation, and noise reduction.

Signal-to-transmission coefficient

| Model | CIGS-TI-105W(*) | CIGS-TI-80W(*) |
|--------------------|-----------------|----------------|
| Transmittance | 20% | 40% |
| Pmax(W) | 105 | 80 |
| Power tolerance(%) | -5/+5 | -5/+5 |
| Vmpp(V) | 61.82 | 61.51 |
| Impp(A) | 1.71 | 1.28 |
| Voc(V) | 78.82 | 78.42 |
| Isc(A) | 2.11 | 1.58 |

STC(Standard test conditions): the amount of irradiation $1000W/m^2$, Battery temperature $25^{\circ}C$, AM(air mass) 1.5

Operation parameters

| | |
|-------------------------------------|----------------------------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | 4.0A |
| Operation temperature | $-40^{\circ}C \sim +85^{\circ}C$ |
| Hail test | Pass |
| Protection grade | IP67 |

Mechanical parameters

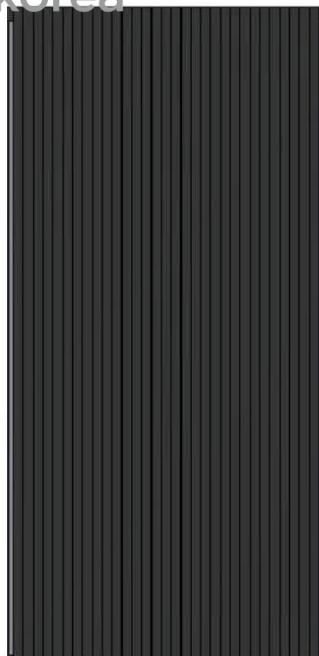
| | |
|-------------------|---|
| Size | 1587mm*664mm |
| Thickness | 31mm |
| Square | $1.05m^2$ |
| Weight | 48Kg |
| Junction box | Pen type junction box |
| Product Structure | 5mm ultra white tempered + 0.76PVB + 2.1mm power generation glass + 0.76PVB + 5mm tempered + 12A + 5mm tempered |
| Transparency | 0%~60% |

(*) Representing actual production place



CIGS Chips

- IEC/EN 61215-2/61730
- DIN V VDE 0126-3, DIN V VDE 0126-5
- Safety level: Class II
- Fire protection class A



| Temperature coefficient | |
|-------------------------|----------------------------|
| NMOT | $20 \pm 2^{\circ}\text{C}$ |
| Pmax- | $0.32\%/^{\circ}\text{C}$ |
| Voc | $-0.17\%/^{\circ}\text{C}$ |
| Isc | $0\%/^{\circ}\text{C}$ |

| Attenuation coefficient | |
|-------------------------------|------|
| First year attenuation | 5% |
| The following year and beyond | 0.4% |



Suitable for customized application scenarios, deep processing units can purchase copper indium gallium selenium battery chips, which can cut or spliced.

| Signal-to-transmission coefficient | | |
|------------------------------------|-----------------|-----------------|
| Model | CIGS-TX-120W(*) | CIGS-TX-125W(*) |
| Pmax(W) | 120 | 125 |
| Power tolerance(%) | 0/+5 | 0/+5 |
| Vmpp(V) | 59.59 | 61.47 |
| Impp(A) | 2.02 | 2.04 |
| Voc(V) | 77.39 | 80.08 |
| Isc(A) | 2.48 | 2.06 |

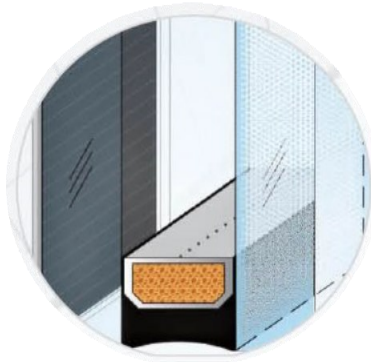
STC(Standard test conditions): the amount of irradiation $1000W/m^2$, Battery temperature $25^{\circ}C$, AM(air mass) 1.5

| Operation parameters | |
|-------------------------------------|----------------------------------|
| Maximum System Voltage | 1000V |
| Reverse current withstand threshold | T20-2.3A/T30-1.9A |
| Operation temperature | $-40^{\circ}C \sim +85^{\circ}C$ |

| Mechanical parameters | |
|-----------------------|--------------|
| Size | 1587mm*660mm |
| Thickness | 2.1mm |
| Square | $1.04m^2$ |
| Weight | 8Kg |

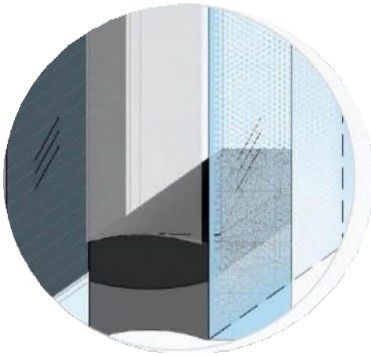
(*) Representing actual production place





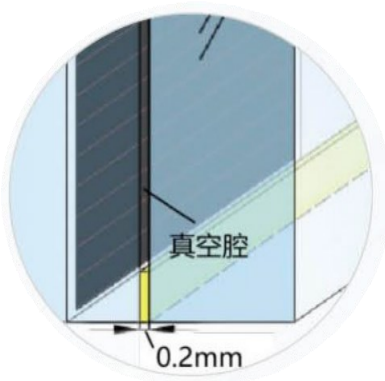
Conventional hollow glass

VS



4SG power generation glass

More energy-efficient, lower U-value of window system
Better air tightness
Longer service life
Better sound insulation performance



Vacuum power generation glass

Excellent energy-saving performance, with a U-value as low as $0.5\text{W/m}^2 \cdot \text{K}$
Thin thickness and friendly installation
Better sound insulation performance



Fireproof power generation glass

Safe fire protection, meeting the requirements of national standard GB15763.1, capable of achieving fire resistance combustion for over 1.5 hours

PV/T photovoltaic

Photovoltaic photothermal integration



Solar energy utilization efficiency

- Greater power generation
- Higher energy utilization rate
- Strength helps zero energy consumption buildings

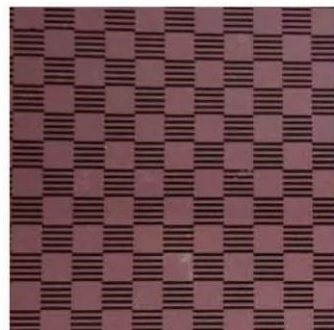
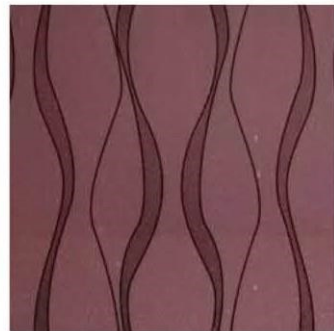
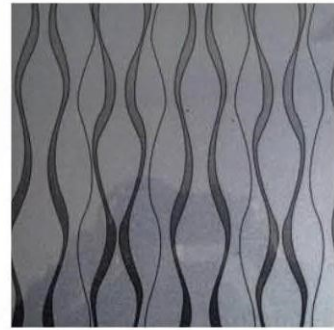
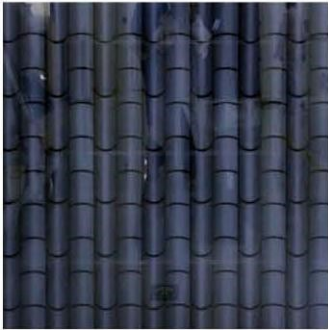
300+ colors available

| | | | | | | | |
|-----------------|---|-------------------|---|--------------|---|---------------|---|
| Chinese Red |  | Brocade gold |  | Golden 327 |  | Green-2 |  |
| Red Flag1 |  | Yellow satin gold |  | Gold 307 |  | Green-3 |  |
| Red Flag2 |  | Sun gold |  | Jin-1 |  | Green-4 |  |
| Sunlight Red |  | orange |  | Jin-2 |  | Green-5 |  |
| Bright Crimson |  | yellow |  | Jin-3 |  | Green-6 |  |
| Brilliant red |  | Sunshine Gold |  | Gold 325 |  | Light green |  |
| Deep Fuhong |  | Red satin gold |  | Emperor Gold |  | White green |  |
| Reddish brown |  | Red gold |  | Gold-2 |  | Grey green |  |
| Sunshine Orange |  | yellow |  | Gold-3 |  | Emerald green |  |
| Copper Brown 1 |  | Light yellow |  | gold |  | Medium green |  |

| | | | | | | | |
|-----------------|---|---------|---|----------------------|---|---------------------|---|
| Forest Green |  | Blue-1 |  | Dark Grey |  | Snowflake Silver |  |
| Stellar green |  | Blue-2 |  | Forested Dark Grey |  | Penguin White |  |
| Dark green |  | Blue-3 |  | Forested medium gray |  | Snow Mountain White |  |
| Blue green |  | Blue-4 |  | Forested light grey |  | Crystal White |  |
| Raul50182 |  | Blue-5 |  | Silver white |  | Jade White |  |
| Raul50212 |  | Blue-6 |  | Silver gray |  | Tile white |  |
| SkyBlue |  | Blue-7 |  | Medium gray |  | Aluminium alloy |  |
| Taro purple |  | Blue-8 |  | Light gray |  | Sky Grey |  |
| Hibiscus purple |  | Blue-9 |  | Aluminum alloy gold |  | Deep Space Grey |  |
| Cheetah Blac |  | Blue-10 |  | white |  | Classical Grey |  |



Patterns can be freely customized



❖ 10%~60% transmittance optional



10% transparency



20% transparency



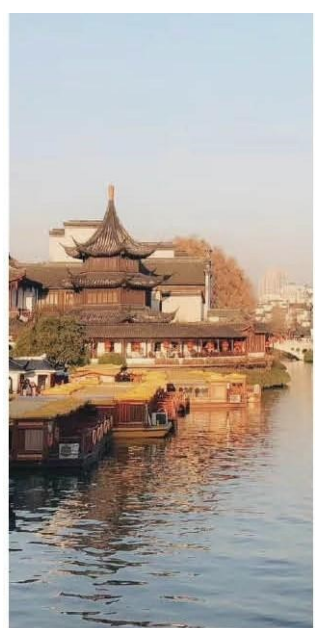
30% transparency



40% transparency



50% transparency



60% transparency

| Model | Construction | Transmittance | Application scenarios |
|---|---|---------------|--|
| Standard Series products for power stations | 3.2mm ultra white toughened glass+0.5mmEVA/0.5mm POE/0.76mmPVB+2.1mm CIGS | 0 | Power Station, carport |
| Standard curtain wall series products | 3.2mmultra white toughened glass+0.5mmEVA/0.5mm POE/0.76mmPVB+2.1mm CIGS | 0 | Curtain wall |
| Colorful series of products | 3.2mm ultra white toughened glazed colored glass+0.5mm EVA/0.5mmPOE/0.76mmPVB+2.1mm CIGS | 0 | Curtain wall and sloping roof |
| Stone imitation series | 3.2mm ultra white toughened glazed colored glass+0.5mm EVA/0.5mmPOE/0.76mmPVB+2.1mm CIGS | 0 | |
| Triple glass Series | 5mm ultra white toughened glass+0.76mmPVB+2.1mm CIGS+0.76mmPVB+5mmtempered glass (color and pattern are optional) | 0 | Curtain wall |
| Hollow Series | 5mm ultra white toughened glass +0.76mmPVB+2.1mm power glass +0.76mmPVB+5mmtoughened glass +12A+6mm toughened glass | 0%~60% | Frame type transparent curtain wall |
| Chip | 2.1mm,1583*660mm,95-135W | 0 | Customers can cut or splice as needed after purchase and then assemble |

Skylight

Hollow Series

5mm ultra white toughened glass
+0.76mm PVB + 2.1mm power
glass CIGS+0.76mmPVB+5mm toughened
glass+12A+6mm toughened glass

Roof BAPV

Standard Series products for power stations

3.2mm ultra white toughened glass + 0.5mm
EVA/0.5mmPOE/0.76mm PVB + 2.1mmCIGS

Transparent curtain wall

Hollow Series

5mm ultra white toughened glass + 0.76mm
PVB+2.1mm CIGS +
0.76 mm PVB + 5mm toughened glass
+12A + 6mm toughened glass

Curtain wall renovation of old houses

BIPV Standard Series

3.2mm ultra white toughened
glass+0.5mmEVA/0.5mmPOE/0.76mmPVB
+2.1mmCIGS

Colored/ Stone Imitation Wall

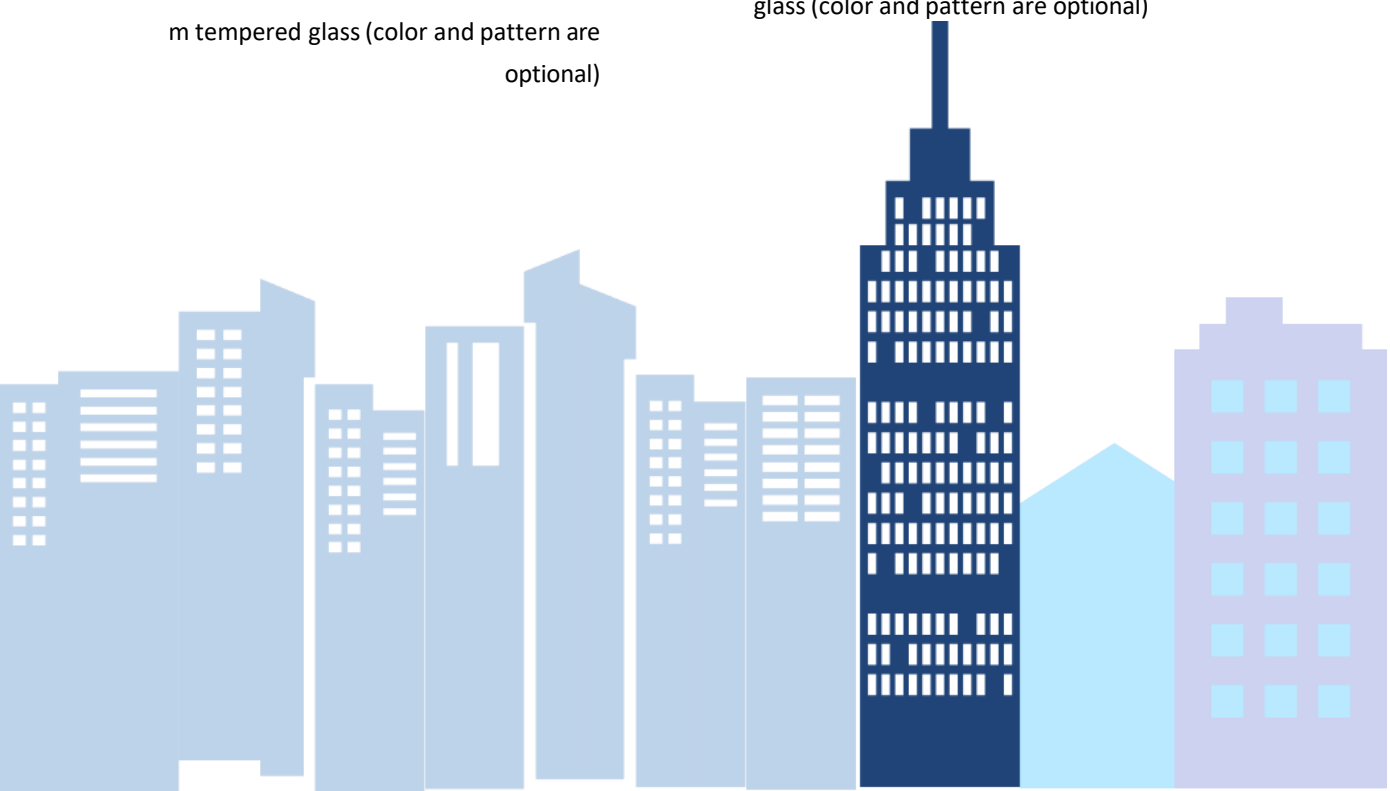
Triple Glass Series

5mm a white toughened glass+
0.76mmPVB+2.1mmCIGS+0.76mmPVB+5m
m tempered glass (color and pattern are
optional)

Interlayer wall

Triple glass Series

5mm ultra white toughened
glass+0.76mmPVB+2.1mm
CIGS+0.76mmPVB+5mm tempered
glass (color and pattern are optional)



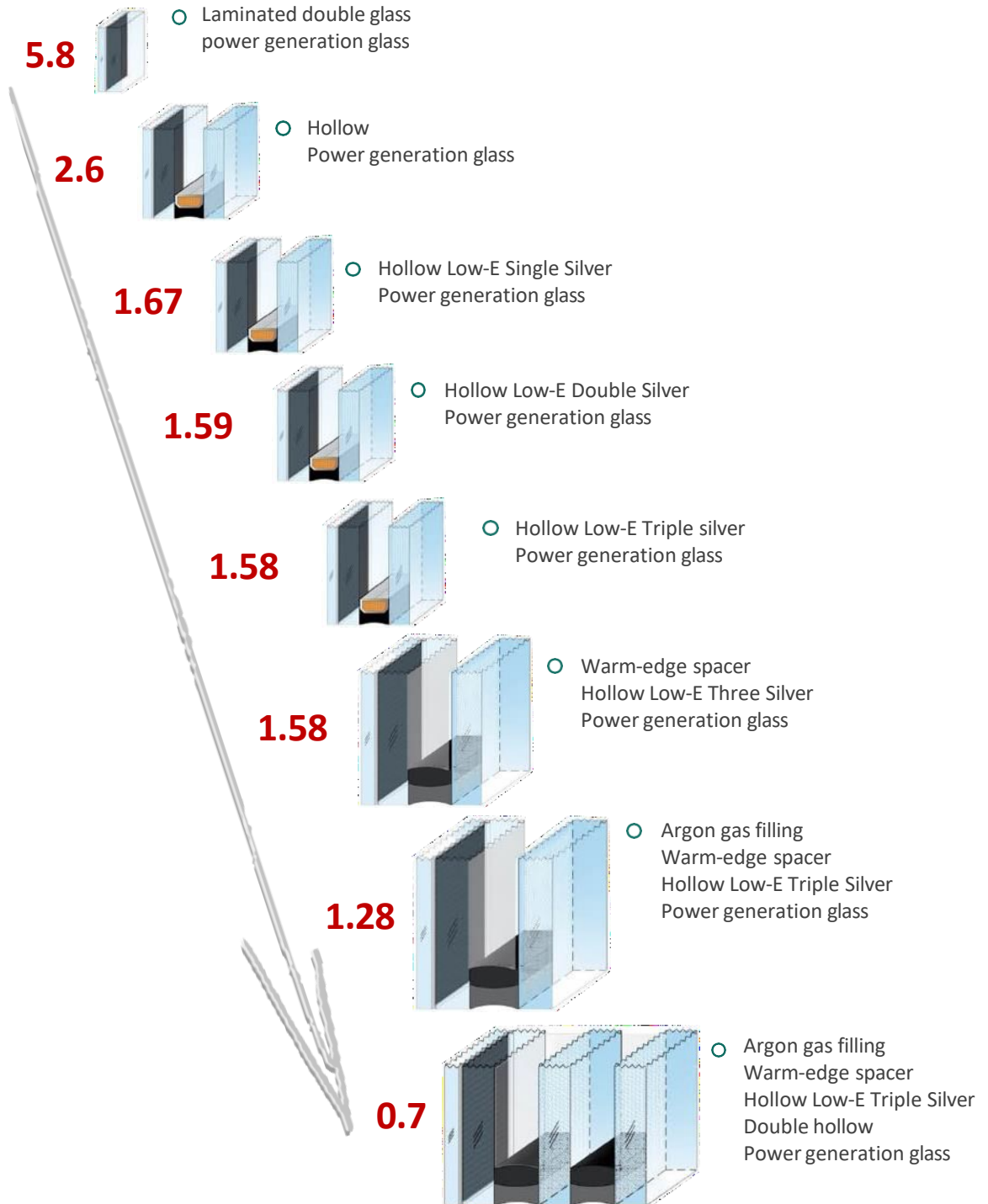
Hollow products – thermal performance

The smaller the U-value (heat transfer coefficient) of the power generation glass, the more energy-efficient the building is.



The U-value is calculated based on the spectral data of the 40% membrane removal product and Lawrence Berkeley Laboratory Window 7.4

Middle of glass



Industrial Roof BAPV Installation Case

Shenzhen Guoxian New Display Industry Base Project



- Projectlocation: Bengbu, Anhui
- Installed capacity:2300kW
- Installation area: 20000 square meters
- Projecttype: RoofBAPV
- Grid connection method: low-voltagegrid connection



Swiss Bern copper indium gallium selenium building photovoltaic integration



Swiss Volg Logistics Distribution Center



German office buildings

Photovoltaic integration of German power generation glass buildings





Bernstein American Research Foundation

The comprehensive renovation of the residential complex, which was completed in 1971. The two bronze colored solar facades on the south and west sides of the high-rise building generate some energy and heat to improve the ecological evaluation of the building.



New Office/Residential Complex Bernstein American Research Foundation

A new energy saving residential and commercial building with CIGS glass has been built on the southeast side of the building complex.





CIGS BIPV projectin Bern, Swiss

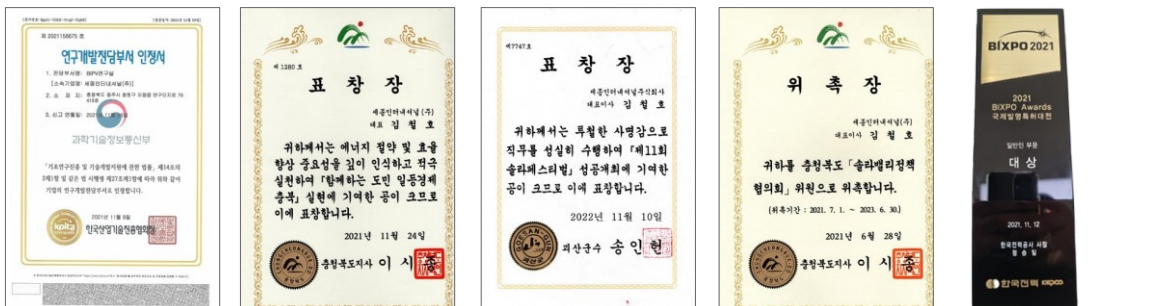


CIGS BIPV projectin Polish

CIGS BIPV projectin Ligenstadt,
Germany



AWARDS AND PATENTS



bipv korea | Singapore

SINGAPORE

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