

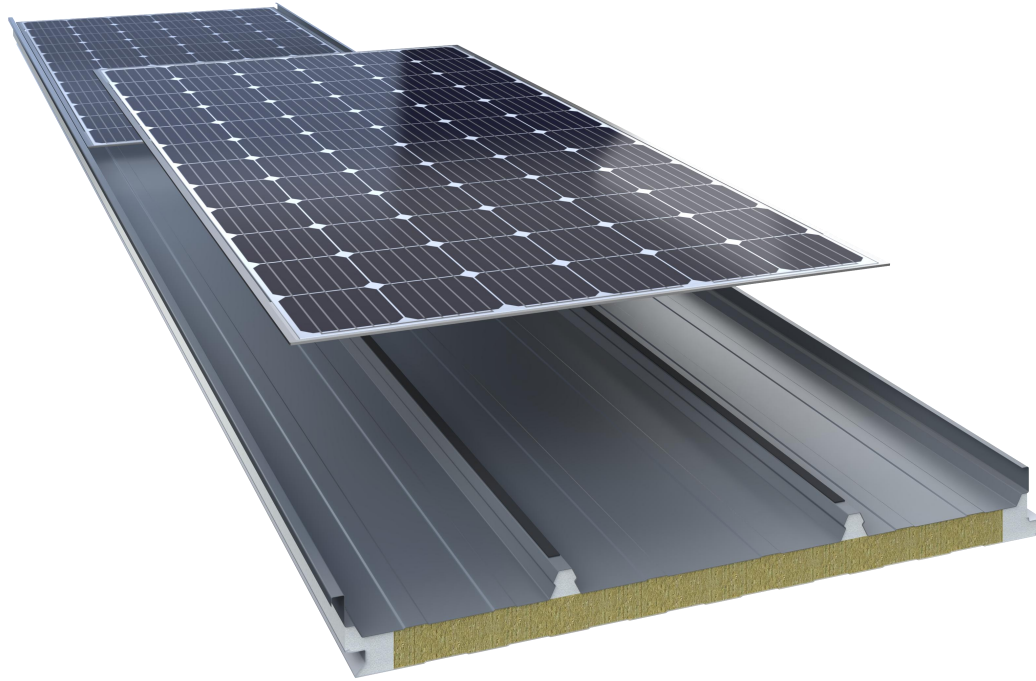


SUSTAINABLE & ENERGY-EFFICIENT
ENHANCED SAFETY

Solar Roofing System

Introduction to Element Solar roofing system

Solar Roof



- Energy-Efficient Roof with Maximum PV Coverage

Building Integrated Photovoltaic Integrated Metal Solar Roofing Panel · BIPV

Solar energy is an abundant, renewable and clean resource. Wind and ocean energy also originate from solar energy.

Photovoltaic technology uses semiconductor cells to convert sunlight directly into electricity. One of its most practical applications in buildings is Building-Integrated Photovoltaics (BIPV).

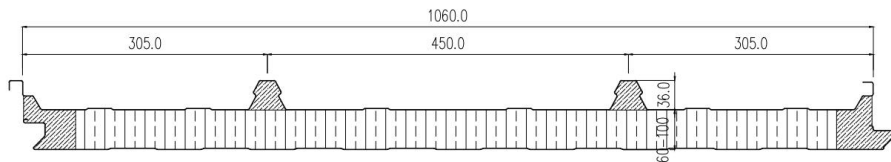
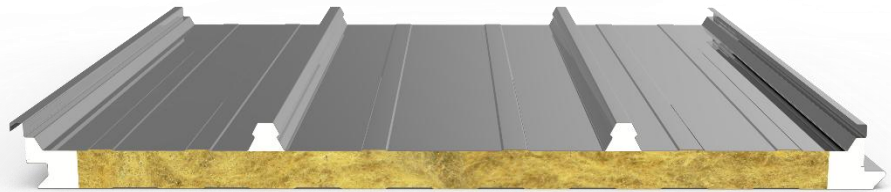
BIPV integrates solar-generation products into the building envelope. It functions as both a power-generating system and a construction material, making it an increasingly attractive choice for energy-efficient buildings.

Designed and installed together with the building, a BIPV roof becomes part of the external structure. It generates electricity, serves as a roof component and creates a clean, unified architectural appearance.



Technical Data — Metal-Faced Sandwich Panel · SolarRoof®

HXY-FD-R-360HN II



High-Strength Bonding with Elastcoat Adhesive

Parameters for Elastcoat adhesive

Testing Item	Data	Method
Lap shear strength	8-10 Mpa	ISO 4587
Open time/ Gel time	30-35 min	Hot Pot Gel Timer
Hardness after curing	50	Shore D

SolarRoof®

1. Technical Specification & Load Table

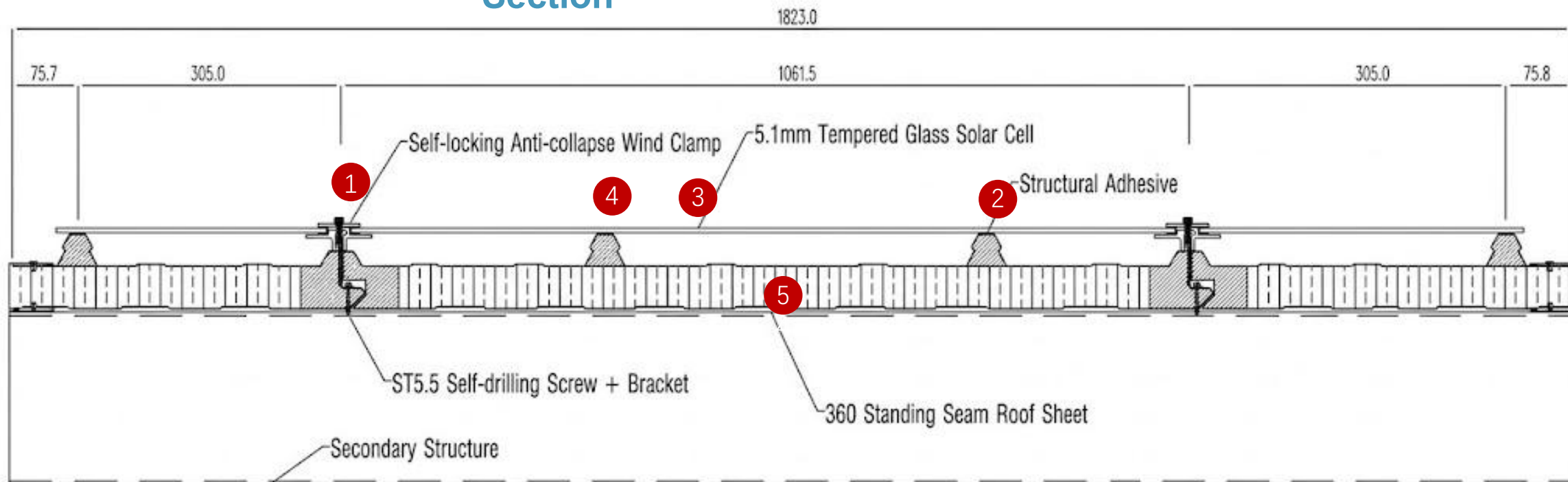
Panel Thickness THK. /mm	Surface Density kg/m ²	Section Moment cm ⁴	Shear Strength MPa	Support Condition	Thermal Transmittance W/m ² ·h	Allowable Load (kN/m ²) / Span Distance (mm)				
						1.0	1.5	2.0	2.5	3.0
50	15.92	108.62	1.5528	Double span (≥2 spans)	0.839	3000	2450	2150	1900	1750
75	18.72	222.30	1.5528	Double span (≥2 spans)	0.584	3750	2950	2500	2200	2000
100	21.52	376.27	1.5528	Double span (≥2 spans)	0.448	4500	3550	2950	2600	2300
150	27.12	805.03	1.5528	Double span (≥2 spans)	0.305	6000	4700	3900	3400	2950

Calculated base on 1000 modulus & 0.6mm (outside) +0.5mm(inside) steel coil ,Rockwool density is 120kg/m³
Reference to appendix A of GB/T23932-2009 and appendix B of JGJT453-2019,Deflection limit=1/200

2. Test Standard

Item	Reference Standard	Class / Index Value
Fire Resistance	GB8624-2012 "Classification for Burning Performance of Building Materials and Products"	Class A1
Thermal Conductivity	GB/T25975-2018 "Prefabricated External Thermal Insulation Composite System with Facing Layer"	0.040 W/(m·K)
Sound Reduction	GB/T20247-2006 "Acoustics – Measurement of Sound Insulation in Buildings and of Building Elements"	13-40dB(400-1000Hz)

I · Frameless PV Insulated Roof Section



1

Wind-Resistant Walkable Clamp

2

Structural Adhesive

3

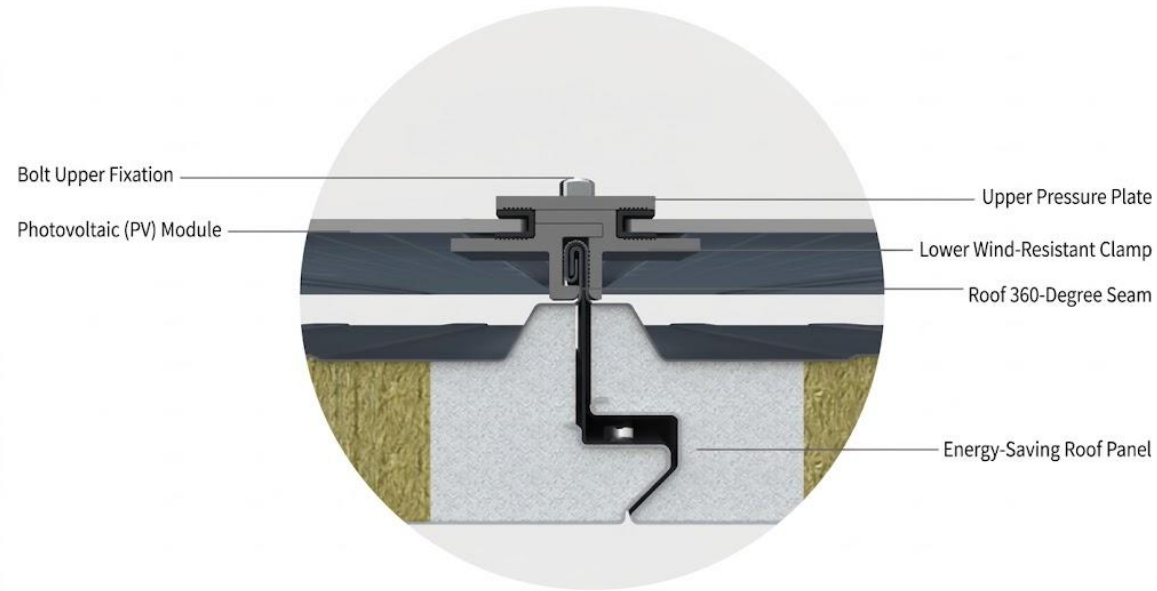
PV Module: 5.1 × 1033 × 2089 mm · 450 W

4

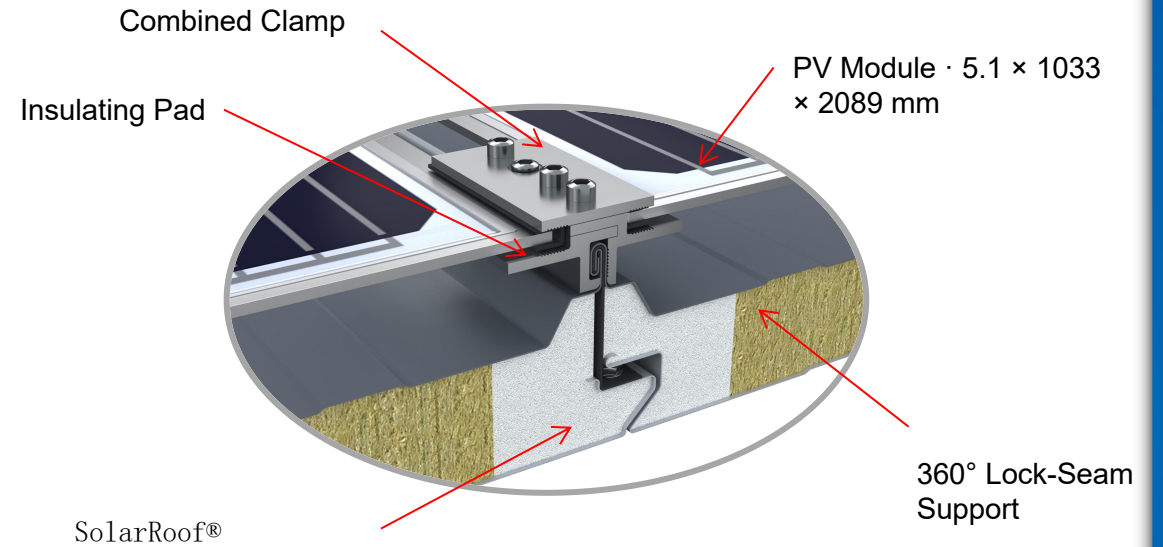
Structural Adhesive

5

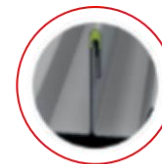
360° Lock-Seam Insulated Roof Panel



Mechanical Roof Connection for Enhanced PV Safety



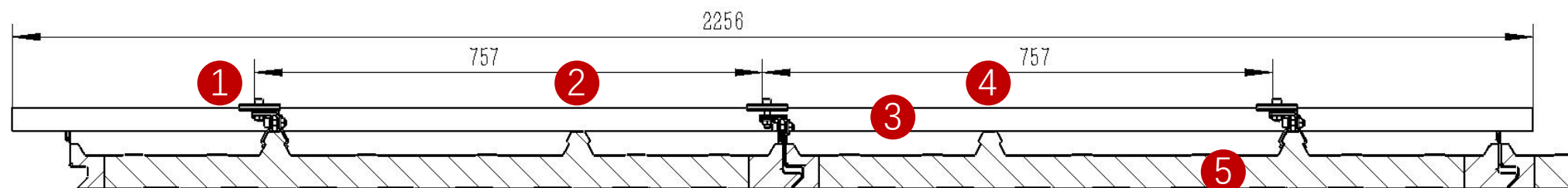
● PV Joint Detail



● Sealed Lock Seam

I · Mechanically Secured PV-to-Roof Connection

II · Framed PV Insulated Roof Section



1

Wind-Resistant Clamp

2

Structural Adhesive

3

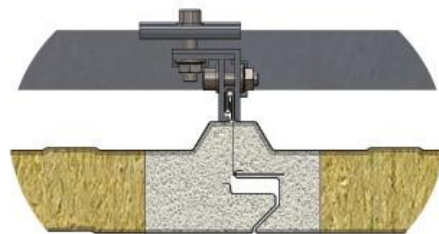
PV Module: 35 × 1134 × 2278 mm · 550 W

4

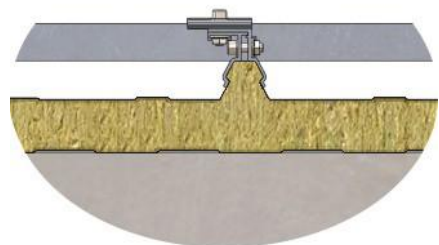
Structural Adhesive

5

360° Lock-Seam Insulated Roof Panel



Wind-Resistant Clamp at 360° Seam



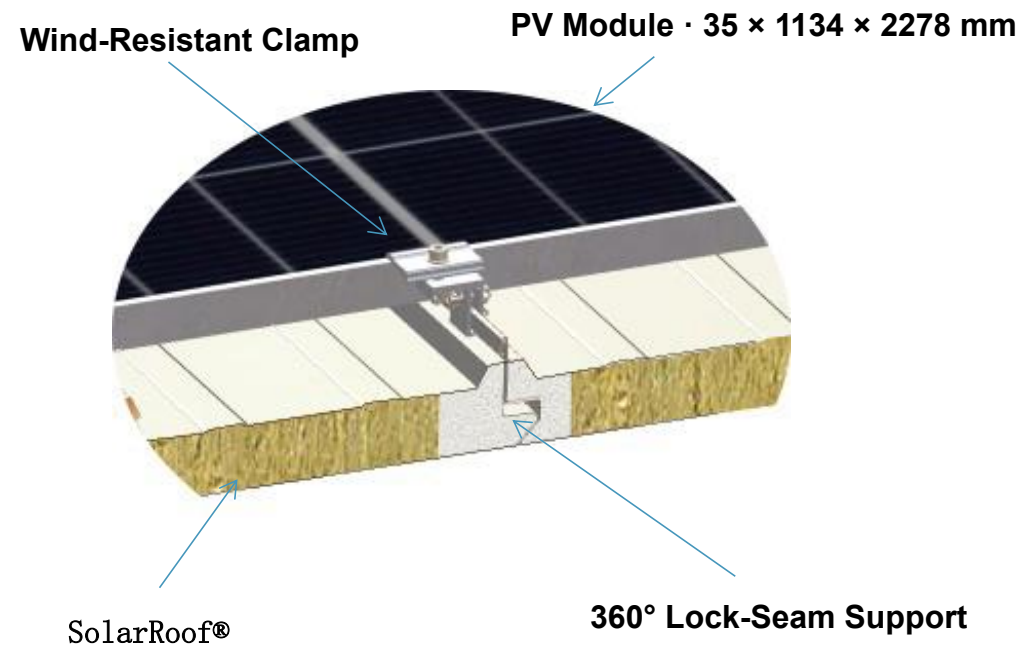
Wind-Resistant Clamp at Rib



Module Connector



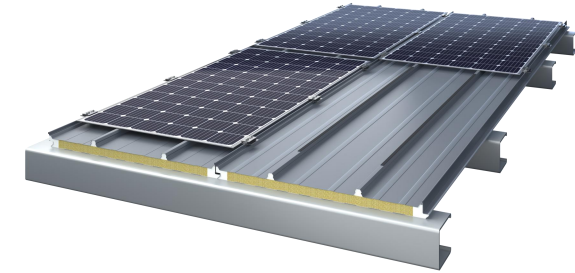
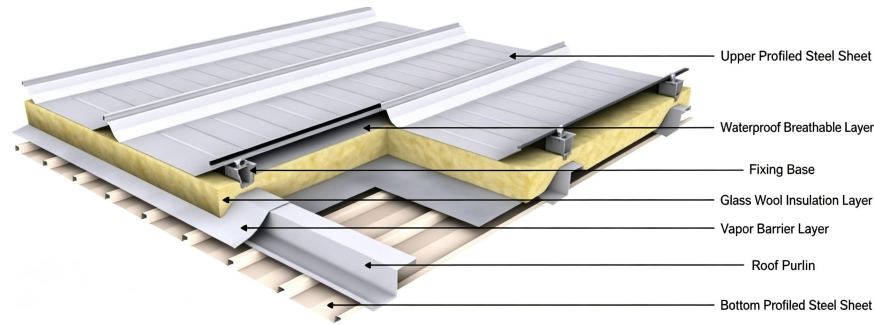
Lock-Seam Seal



II · Mechanically Secured PV-to-Roof Connection



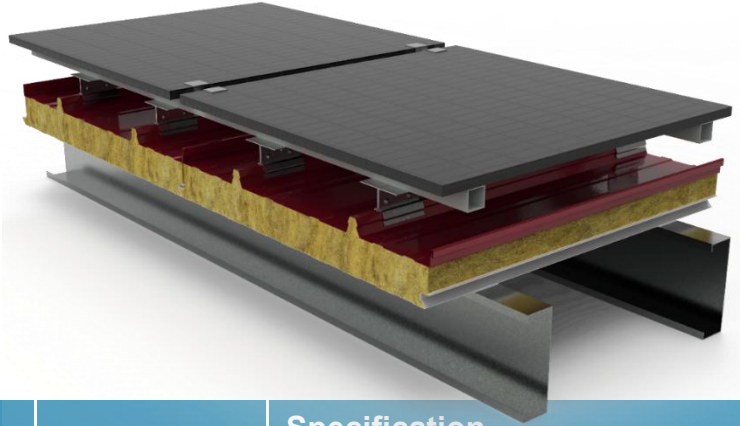
Site-Assembled BAPV vs. Metal-Faced Sandwich-Panel BIPV



Layer	Item	Specification		Key Difference
		Site-Assembled BAPV	Metal-Faced Sandwich-Panel BIPV	
1	PV module	35 mm framed monocrystalline module 35 × 1133 × 2256 mm · 540 W	5.1 mm crystalline-silicon module 5.1 × 1033 × 2089 mm · 450 W	Approx. 5 kg weight difference
2	PV rails	PV rails · approx. 6 kg/m ²	None — installed directly on panel	Approx. 6 kg/m ² lighter
3	PV clamps	Dedicated clamps · 1.88 pcs/m ²	Walkable wind-resistant clamp · 0.9 pcs/m ² + BASF structural adhesive	Approx. 50% fewer clamps
4	Single-layer roof panel	Site-assembled roof · approx. 13–16 kg/m ² (glass wool / rock wool)	Factory-made sandwich roof panel · approx. 16 kg/m ² (50 mm rock wool)	Site assembly vs. factory prefabrication
5	Roof-panel supports	1.41 supports + 2.83 self-tapping screws/m ²	0.47 supports + 0.94 self-tapping screws/m ²	Approx. two-thirds fewer fasteners
6	Breathable waterproof membrane	0.5 mm membrane	None — hydrophobic rock wool is integrated	Less labor and shorter installation
7	Insulation	24 kg/m ³ , 50 mm glass wool · approx. 1.2 kg/m ²	None — hydrophobic rock wool is prefabricated	Less labor and shorter installation
8	Vapor barrier	0.5 mm vapor barrier	None — integrated with hydrophobic rock wool	Less labor and shorter installation
9	Roof liner sheet	0.5 mm single sheet · approx. 5 kg/m ²	None — factory prefabricated	Less labor and shorter installation
10	Main purlin	C200 × 70 × 20 × 2.0 · G350/Z275 Typical spacing: 1500 mm	C200 × 70 × 20 × 2.0 · G350/Z275 Typical spacing: 2000 mm	10–20% lower steel use and roof dead load



BAPV vs. Metal-Faced Sandwich-Panel BIPV



Layer	Item	Specification		Key Difference
		Metal-Faced Sandwich-Panel BAPV	Metal-Faced Sandwich-Panel BIPV	
1	PV module	35 mm framed monocrystalline module 35 × 1133 × 2256 mm · 540 W	5.1 mm crystalline-silicon module 5.1 × 1033 × 2089 mm · 450 W	Approx. 5 kg weight difference
2	PV rails	PV rails · approx. 6 kg/m ²	None — installed directly on panel	Approx. 6 kg/m ² lighter
3	PV clamps	Dedicated clamps · 1.77 pcs/m ²	Walkable wind-resistant clamp · 0.9 pcs/m ² + BASF structural adhesive	Approx. 50% fewer clamps
4	Roof panel	Sandwich roof panel · approx. 16 kg/m ² (50 mm rock wool)	Sandwich roof panel · approx. 16 kg/m ² (50 mm rock wool)	Factory prefabricated
5	Roof-panel supports	0.5 supports + 1 screw/m ²	0.47 supports + 0.94 screws/m ²	Based on 2000 mm sandwich-panel purlin spacing
6	Main purlin	C200 × 70 × 20 × 2.0 · G350/Z275 Typical spacing: 2000 mm	C200 × 70 × 20 × 2.0 · G350/Z275 Typical spacing: 2000 mm	Lower BIPV dead load saves structural steel



BAPV vs. Metal-Faced Sandwich-Panel BIPV

Overall Difference

- ① Simpler BIPV build-up with no PV rails, reducing installation time and labor by more than 20%.
- ② Clear walking areas without dense rails improve site safety.
- ③ Dual wind-uplift protection from clamps and structural adhesive; adhesive pull-out strength exceeds typical operating requirements by more than 10×.
- ④ Lower dead load improves structural safety and reduces roof weight by about 10 kg/m².





PV Coverage Comparison: BAPV vs. BIPV

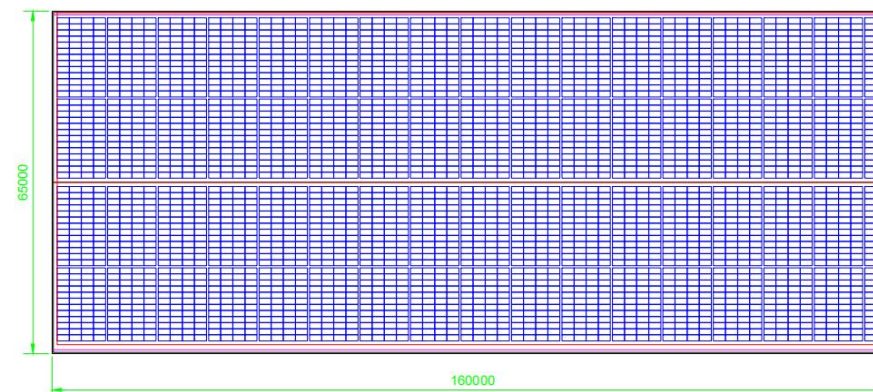
BAPV: 3,013 modules · 1.6 MW



Project Statistics	
Building Area:	10301
PV Module Specifications:	2274*1134*35mm
PV Module Power:	540 W
PV Module Quantity:	3013 pcs
Total Installed Capacity:	1.62702 MW
Translucent Module Quantity:	0 pcs
O&M Walkway Quantity:	0 pcs

Legend	
Photovoltaic (PV) Module:	
Metal Sheet Walkway:	
Color Steel Tile:	
Light Transmissive Component:	
Light Transmissive Walkway:	

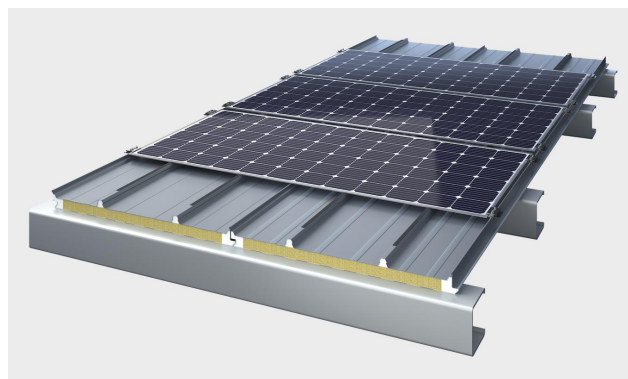
BIPV: 3,366 modules · 1.8 MW



Project Statistics	
Built Area:	10301 m ²
PV Module Specification:	2274*1134*35mm
PV Module Power:	540 W
PV Module Quantity:	3366 units
Total Installed Capacity:	1.81764 MW
Light Transmissive Component Qty:	0 units
Operation & Maintenance Walkway Qty:	0 units

Legend	
Photovoltaic (PV) Module:	
Metal Sheet Walkway:	
Color Steel Tile:	
Light Transmissive Component:	
Light Transmissive Walkway:	

With full-roof coverage, BIPV can increase capacity by 10%; on roofs with other functional areas, the gain can reach about 30%. ↑



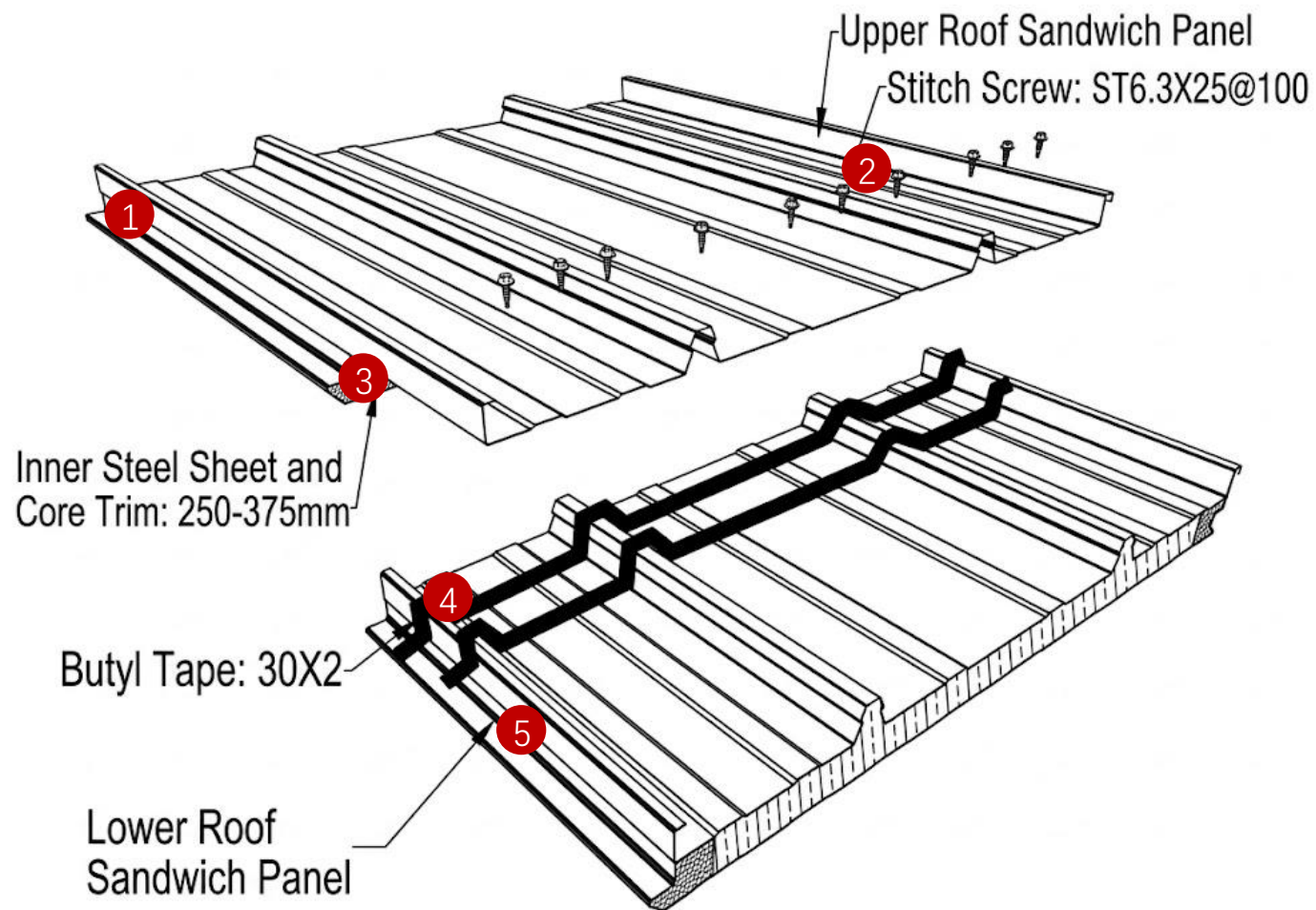
● Horizontal Installation — Perspective View

Building Integrated Photovoltaic Integrated Metal Solar Roofing Panel · BIPV

1. Secure lock-seam design resists wind uplift and foot traffic.
2. Maximizes usable roof area for PV module coverage.
3. High-strength bonding with BASF Elastocoat structural adhesive.
4. Even adhesive distribution balances loads for greater stability and safety.
5. Excellent thermal and fire performance; rock wool, glass wool, polyurethane and sealed-edge options are available.
6. Fast, safe installation after the roof purlins are completed.

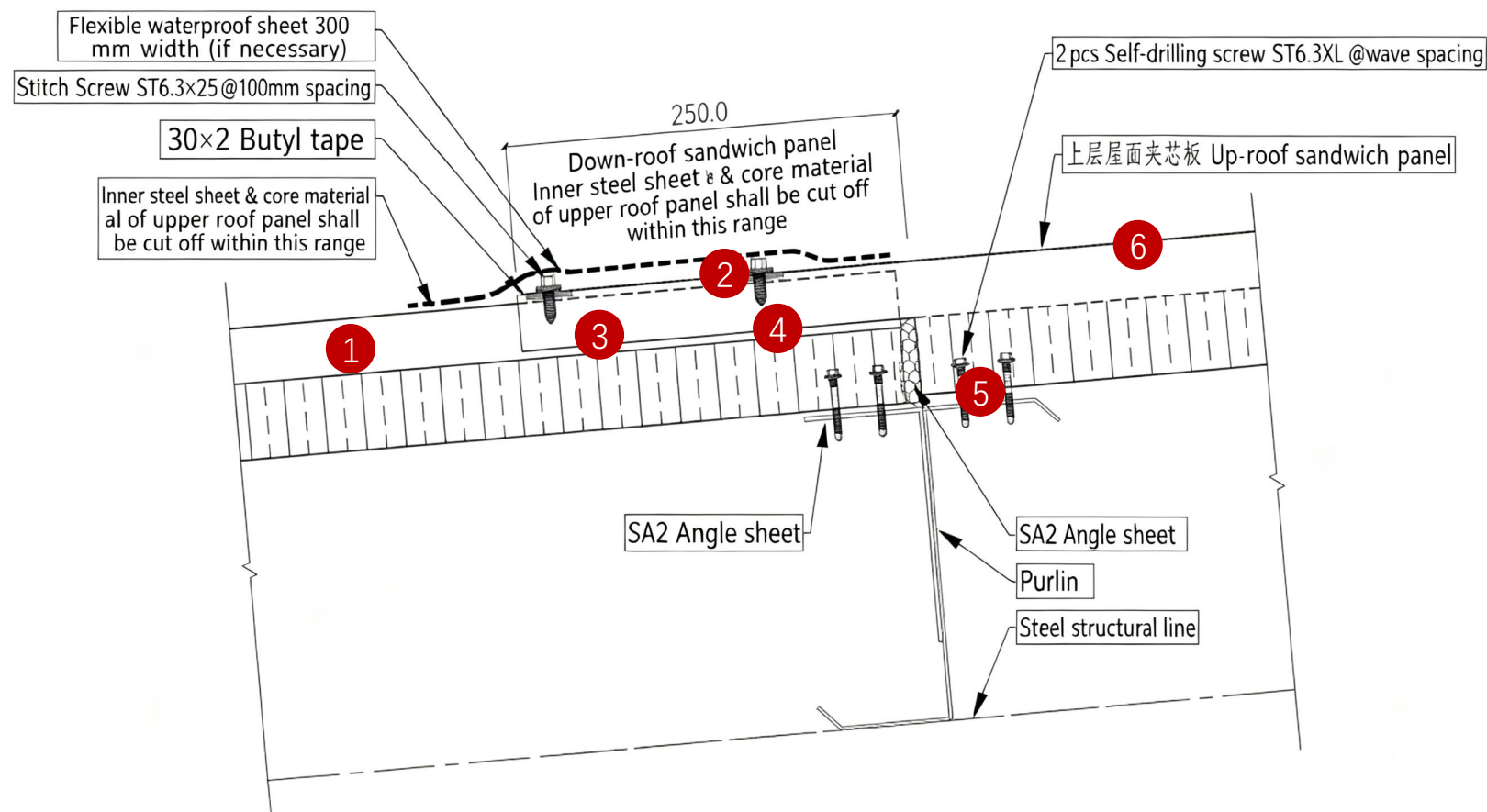
Key Innovations

1. Horizontal or vertical installation to match standard PV module dimensions.
2. Customer-oriented roof-angle design to meet project needs and optimize power generation.



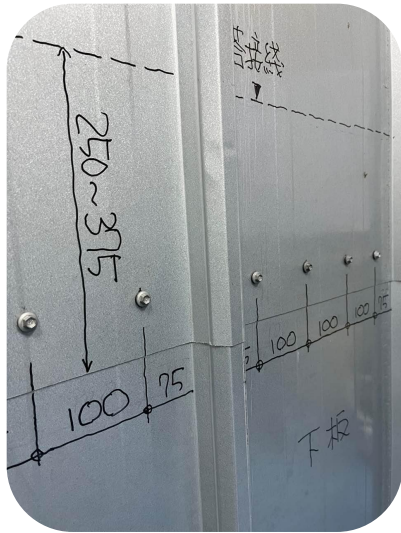
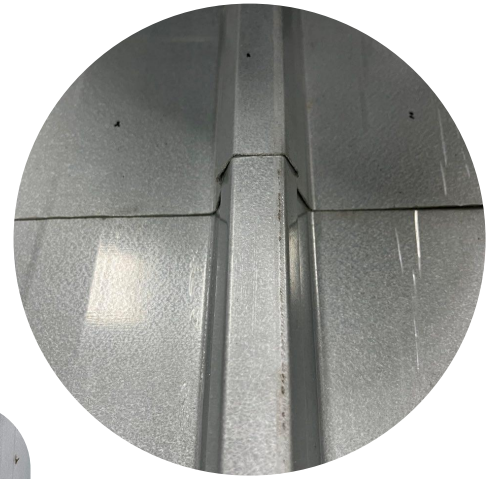
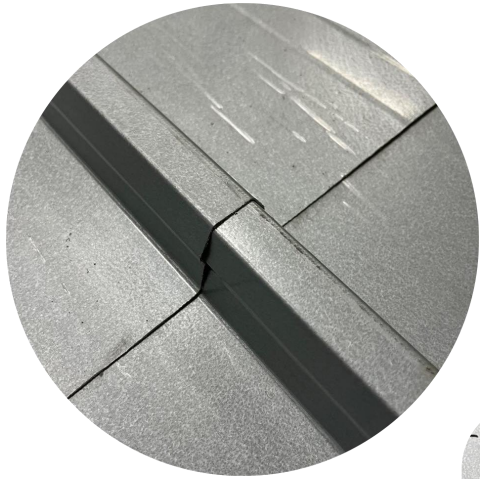
PV Roof Lap Joint — Perspective View

- 1 Upper Insulated Roof Panel
- 2 Stitching Screw ST6.3 × 25 @ 100 mm
- 3 Remove 250–375 mm of Upper Panel Core
- 4 Two Layers of Waterproof Butyl Tape
- 5 Lower Insulated Roof Panel

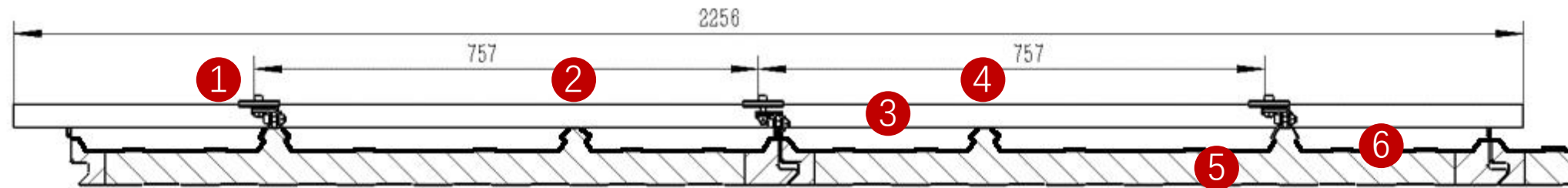


PV Insulated Roof Lap Joint — Section

- 1 Lower Insulated Roof Panel
- 2 Remove Upper Steel Skin and Core in This Area
- 3 Stitching Screw ST6.3 x 25 @ 100 mm
- 4 Two Layers of Waterproof Butyl Tape
- 5 Expanding Foam Sealant
- 6 Upper Insulated Roof Panel



III · Framed PV Insulated Roof Section



1

Wind-Resistant Clamp

2

Structural Adhesive

3

PV Module:
35 × 1134 × 2278 mm · 550 W

4

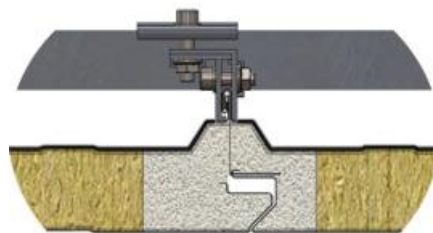
Structural Adhesive

5

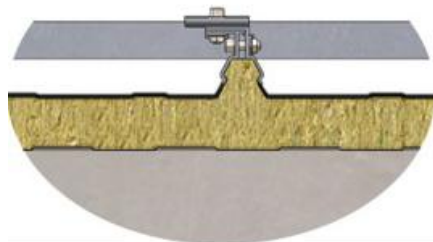
360° Lock-Seam
Insulated Roof Panel

6

Waterproof Membrane



**Wind-Resistant Clamp
at 360° Seam**



**Wind-Resistant
Clamp at Rib**



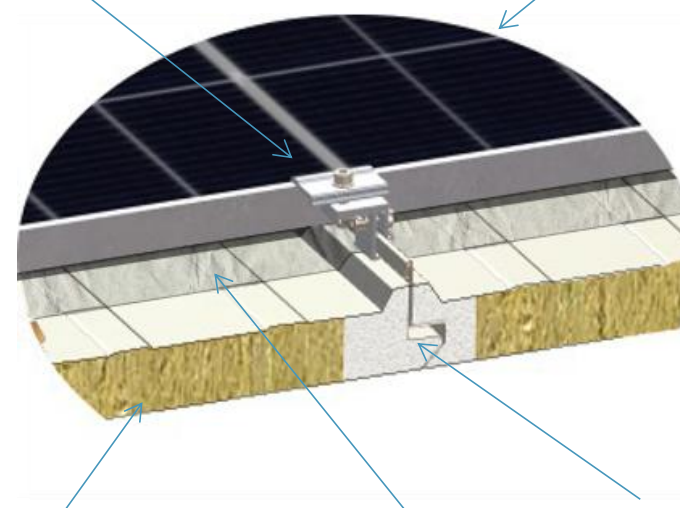
**Module
Connector**



**Lock-Seam
Seal**

Wind-Resistant Clamp

**PV Module · 35 × 1134 ×
2278 mm**



SolarRoof®

**Waterproof
Membrane**

**360° Lock-
Seam Support**

III · Mechanically Secured PV-to-Roof Connection



Advantages of System III

System Advantages

- ① Meets the new Class I roof-waterproofing requirements.
- ② Lap joints along long single-slope roofs release thermal-expansion and contraction stress.
- ③ The 360° lock seam has no exposed screw heads, allowing the waterproof membrane to lie flat against the roof.
- ④ Low ribs provide high stiffness and help optimize purlin spacing and cost. Drainage slope can be designed for solar exposure without rib-height constraints, preserving more effective waterproofing area.
- ⑤ The waterproof membrane fully covers the roof without penetrations for fastening.





15.51
0.10



15.51
0.10



大梁节点一
1/20



大梁节点二
1/20



大梁节点三
1/20



大梁节点四
1/20



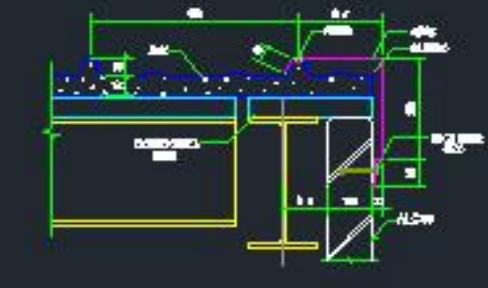
KAPPA-



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图 10-10 桥墩横断面



图 10-11 桥墩横断面

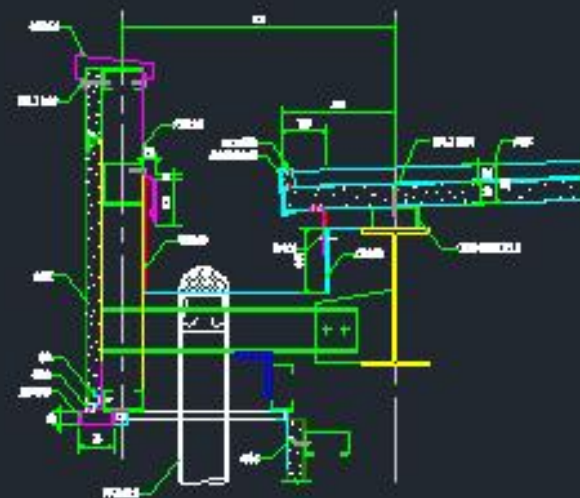


图 10-12 桥墩横断面



图 10-13 桥墩横断面



1 Fast and Easy Installation

Photovoltaic (PV) panels can be directly installed after the roof panel is complete and the surface is cleaned.

Immediately after the roof is finished, PV can be installed without the need for mounting rails or a support structure. Direct PV panel installation.

2 Strong Wind Uplift Resistance

Double fixation: two spots of special structural adhesive + two spots of roof panel clamps. Safety doubled.

The wind uplift forces on the PV roof are extreme. In addition to special structural adhesive for fixation, clamps on both sides provide double fixation to ensure long-term resistance of the PV roof against positive and negative wind pressure.

3 Lightweight Overall Roof Structure

Eliminate roof conversion support framework and aluminum frames required for fixing PV panels, greatly reducing costs

Directly attached and integrated with the roof, eliminating the need for PV mounting rails and PV frame components, significantly reducing construction costs and roof weight.

4 Heat Insulation and Fire Resistance

PV roofs maximize sunlight exposure; energy-efficient roofs are the most efficient way to resist heat transfer.

Energy-saving composite roof panels are the best material for insulation and fire protection. The roof requires a large amount of sunlight and ensures indoor energy efficiency and comfort.



5 High-efficiency Power Generation Capacity

The Element photovoltaic (PV) roof system maximizes the area covered by panels on the roof for maximum power generation.

The layout uses 2089*1033mm PV units to achieve the maximum realization of rooftop PV power generation efficiency.

6 Low Risk at Lap Joint Points

Rooftop lap joint areas are protected by a near-complete coverage of PV cell sheets, significantly reducing long-term potential risks and mitigating uncertain problems caused by thermal expansion and contraction.

The lap joints feature triple waterproofing. Even under continuous high-temperature exposure, this effectively mitigates uncertain problems caused by thermal expansion and contraction.

7 Fast Rooftop Construction

Energy-saving roof panels produced in the factory provide stable quality assurance. Direct installation on site with simple and verified procedures.

Rooftop energy-saving panels, after factory completion, are directly installed and constructed on site. The rooftop does not need multi-step tedious procedures, fast and safe.

8 Safety & Easy Maintenance

Frameless design, avoids dust build-up, and is easy to maintain. High load-bearing capacity surface, designed for walking, accessible by personnel for O&M.

After rooftop PV installation is completed, personnel can directly walk on it for inspection and maintenance. Removing aluminum frames avoids dust build-up that affects power generation efficiency.



9 Meets Waterproofing Requirements

Meets the new Class I roof-waterproofing requirements.

10 Releases Thermal-Expansion Stress

Lap joints along long single-slope roofs release stress caused by thermal expansion and contraction.

11 Full Contact Between Membrane and Roof

The 360° lock seam leaves no exposed screw heads, allowing the waterproof membrane to lie flat against the roof.

12 Meets Requirements at Lower Cost

Low roof ribs provide high stiffness with a low moment of inertia, helping optimize purlin spacing and cost. Drainage slope can be designed for solar exposure without rib-height constraints, preserving more effective waterproofing area.

13 Full Coverage Without Membrane Penetration

The waterproof membrane fully covers the roof without penetrations for mechanical fastening.



ENERGY-EFFICIENT ROOFING ENHANCED SAFETY

ENVIRONMENTAL PROTECTION AND ENERGY CONSERVATION, DOUBLE SAFETY