Photovoltaic integrated insulated rooftop system

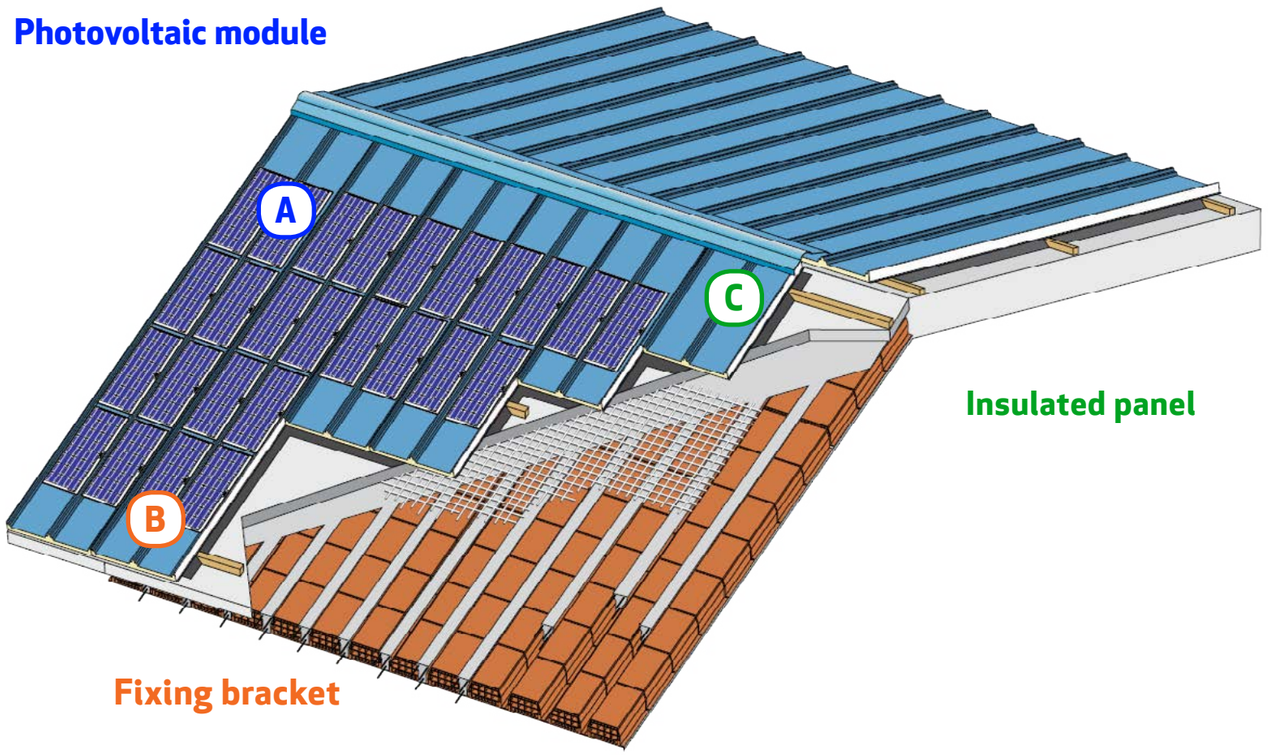
The TSE CLIMA System of VGS Italian PV Solutions® is designed to combine the benefits of an insulated roof with those arising from the installation of a photovoltaic system.

TSE CLIMA consists of 3 elements:

- the **photovoltaic module** with lowered frame (A), to be installed perfectly within the external corrugated roofing panel profiles;
- special stainless steel **fixing brackets** (B), which bind the photovoltaic modules to the corrugated roof panel profiles without drilling holes and create a cavity for ventilation of the back of the module;
- the **insulated rooftop panel** (C) composed of an outer covering in pre-coated steel sheet with corrugated profiles within which a high density polyurethane foam core PUR (PIR on request) with high insulating performance is applied.

Environmental benefit

Il The system is widely used in environmental reclamation, given the problems linked to asbestos-cement roofing.



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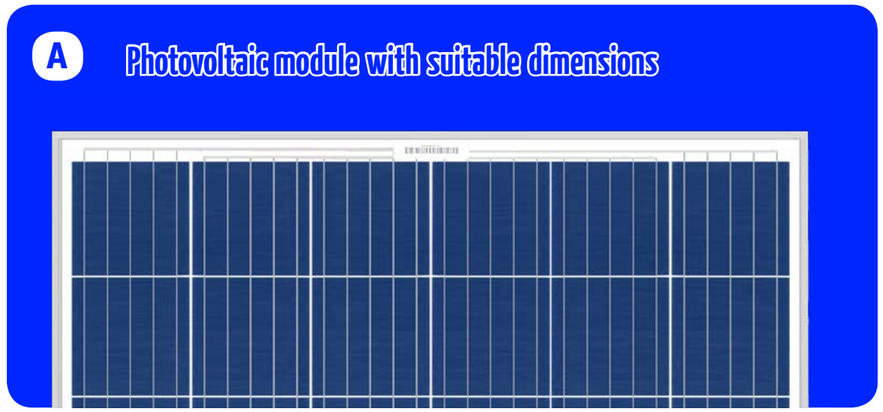
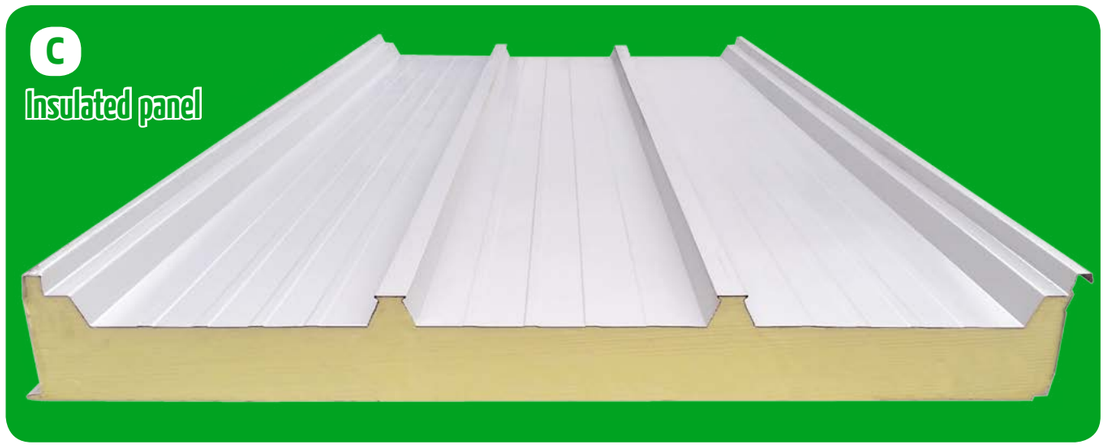
TSE CLIMA System BAPV integrated insulated system

Elements making up the TSE CLIMA system



Easy and quick installation with no drilling



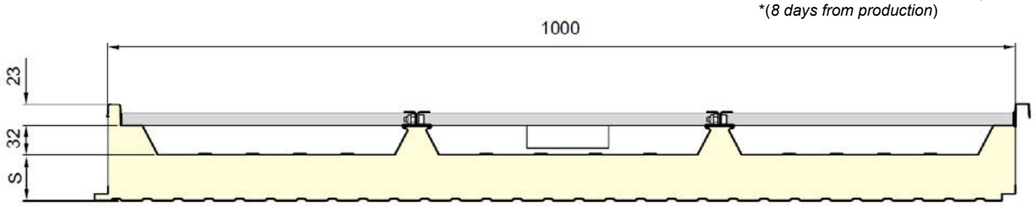
The TSE CLIMA System of VGS Italian PV Solutions® offers the following advantages:

Thermal insulation and self-production of photovoltaic energy: energy saving, economical advantage.

The insulated panel with polyurethane foam PUR, made in Italy, has thermal transmittance values which can meet the legal requirements concerning thermal insulation currently in force.
This in addition to the self-production of photovoltaic solar energy, a renewable and clean source. All thanks to an engineering system that does not neglect the overall aesthetic quality

Coefficient of heat loss		
Panel thickness	*Trasmittance* **EN UNI 14509**	*Trasmittance* (8 gg / *8 days)**
(mm)	U = W/m²K	U = W/m²K
40	0,53	0,49
50	0,43	0,40
60	0,36	0,33
80	0,27	0,25
100	0,22	0,20
120	0,18	0,17

Calculations made on 0.4 + 0.4 mm panels
*(*8 days from production*)



Improves the efficiency of the BAPV integrated system

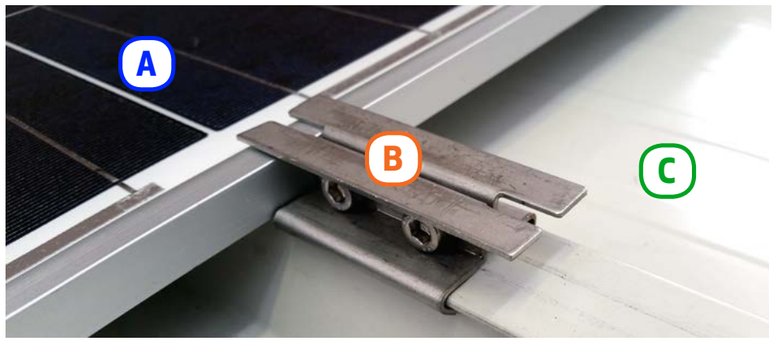
The ventilated cavity between the module and the insulated panel is the ideal solution to dissipate heat, making the system less sensitive to high summer temperatures, increasing the efficiency of the photovoltaic system.
The rain water flows directly into the gutter without infiltrations inside the structure (if installed with a slope not less than 7%).

Photovoltaic installation compatible with Fire Department guidelines

Fire prevention inspections do not apply to photovoltaic systems. However, installing a photovoltaic system at the service of an activity subject to fire prevention inspections requires compliance with the technical installation requirements contained in the Fire Department Guidelines of 2012 and subsequent clarifications.
TSE CLIMA systems use photovoltaic modules that have been certified in Class 1 reaction to fire, corresponding to the highest safety requirement, so there are no resistance to fire limitations for the roof (intended as an overall structure).
On demand, the insulated panel can be produced based on PIR polyurethane foam classified B-s2, d0 (reaction to fire), B-roof rated, T3 (Rooftop fire resistance).

No bores

This is the great advantage of this system which ensures its integrity over time.
Unlike a normal metal roof, using special stainless steel brackets makes it possible to fix the insulated panel to the photovoltaic modules without drilling any holes, preventing the formation of problems linked to infiltrations and thermal bridges.



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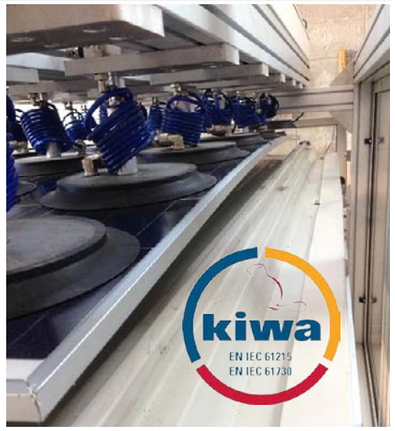
Quick and easy installation

The TSE CLIMA System is fast and easy to install because the insulated panels are supplied with standard width (1 metre) and length as required (up to a maximum of 12 m), so that, one after another, the entire roof is covered. This is followed by the subsequent installation of the photovoltaic system as the modules are accommodated within the tracks formed by external corrugated profiles. Modularity and efficiency of the system saves on work.



The TSE CLIMA System has achieved certifications at KIWA CERMET Italia test labs accredited with ACCREDIA

TSE CLIMA passed the most stringent testing in extreme weather and mechanical conditions, obtaining the official certifications IEC 61215:2005, 61730-1:2013, 61730-2:2012. It is resistant to hail, snow loads and ice up to a maximum applied pressure of 550 kg/m2 and wind pressure up to 130km/h.
The following table displays the maximum admissible load values which the insulated panel withstands.

MAXIMUM UNIFORMLY DISTRIBUTED LOAD (daN/m2) - DEFLECTION ≤1/100 L											
Thickness (mm)	*supports*	*Pitch "L" in metres between the supports*									
		▲ L ▲									
		1.50	**2.00**	**2.50**	**3.00**	**3.50**	**4.00**	**4.50**	**5.00**	**5.50**	**6.00**
40	0,5+0,5	*470*	*226*	*132*	*86*	*60*	*43*	*32*	*24*	*19*	*15*
50	0,5+0,5	*522*	*261*	*159*	*107*	*76*	*57*	*43*	*34*	*26*	*21*
60	0,5+0,5	*573*	*296*	*185*	*127*	*93*	*70*	*55*	*43*	*35*	*28*
80	0,5+0,5	*672*	*365*	*237*	*169*	*127*	*99*	*79*	*64*	*52*	*43*
100	0,5+0,5	*712*	*443*	*289*	*111*	*162*	*128*	*104*	*85*	*71*	*60*
120	0,5+0,5	*714*	*501*	*341*	*253*	*196*	*158*	*129*	*108*	*91*	*77*
Thickness (mm)	*supports*	*Pitch "L" in metres between the supports*									
		▲ L ▲ L ▲ L ▲									
		1.50	**2.00**	**2.50**	**3.00**	**3.50**	**4.00**	**4.50**	**5.00**	**5.50**	**6.00**
40	0,5+0,5	*643*	*471*	*371*	*265*	*191*	*144*	*113*	*91*	*74*	*62*
50	0,5+0,5	*671*	*492*	*386*	*318*	*236*	*178*	*139*	*111*	*91*	*76*
60	0,5+0,5	*690*	*512*	*402*	*331*	*281*	*212*	*165*	*133*	*109*	*91*
80	0,5+0,5	*714*	*546*	*435*	*357*	*302*	*262*	*219*	*175*	*144*	*120*
100	0,5+0,5	*730*	*556*	*450*	*371*	*315*	*273*	*240*	*216*	*176*	*149*
120	0,5+0,5	*732*	*558*	*455*	*376*	*318*	*276*	*243*	*218*	*196*	*179*

(Note) *For information purposes only is reported the present test report that, under no circumstances, should be interpreted as a valid element to establish or calculate flow rates. It is the responsibility and care of the client and / or designer drafting calculations for specific flow required for each use. If the needs of the client and / or project requiring thicknesses and / or grades of steel outside of the standard version, the same must be specifically set out and made known to the manufacturer, with decimal values and their tolerances.*

Safety at a height

In the design phase it will be easy to predict paths and walkways along which safety latches that lead to life lines will be placed on the ridge of the roof, to which one must be secured to perform the intended operations at a height in safety (photovoltaic system maintenance and cleaning).

Choice and versatility

The insulated panel (PUR or the variant PIR based on specific requests), comes in different colours and thicknesses according to the demands and needs of the customer. The photovoltaic system can also be composed of modules with cells and frames of different colours and efficiency, to adapt it better to its surroundings. The TSE CLIMA system can be used on all types of roof tops: industrial, commercial, religious, civil and farming.

Before installation - roof covering in asbestos, object of reclamation

After installation - roof resurfacing with TSE CLIMA system

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Performance and combinations

The TSE CLIMA system retains all the technical and performance features of the VGS Italian PV Solutions module, as it can use all the modules in different combinations as a base:

- Cell technology: mono/polycrystalline;
- Cell staining: standard: standard (blue) / black / red / green;
- Staining of the back sheet: standard (white) / black / red / green / transparent / etc.;
- Staining of the module frame: standard (aluminium) / red / green / black / etc.;

System configuration: contact our VGS Italian PV Solutions commercial network.

Elements used in TSE CLIMA system

Photovoltaic module	**with dedicated frame**
Fixing bracket	**in stainless steel**
Insulated panel	**in pre-coated steel and PUR polyurethane foam filling (PIR version on request), length up to 12 m**

Electrical specifications of the photovoltaic module with dedicated frame

Given the large number of possible combinations of components that make up the TSE CLIMA system, for electrical specifications, it is necessary to refer to the individual product data sheets (photovoltaic module)

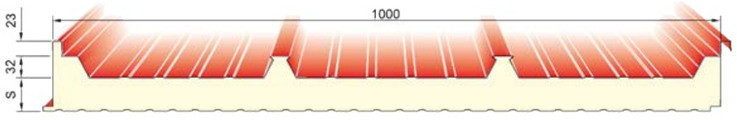
Possible combinations of the photovoltaic module with dedicated frame

Cells per module	**60**
Cell type	**5BB - Monocrystalline / Polycrystalline**
Colour of polycrystalline cell	**Standard (Blue) / Red / Green**
Colour of monocrystalline cell	**Black**
Backsheet colour	**Standard (White) / black / red / green / transparent / etc.**
Frame colour	**Standard (Aluminium) / red / green / blacka / etc.**
Front side	**Anti-glare tempered glass (EN 12150)**

Dimensional features of insulated panel and photovoltaic module

Measurements Insulated panel TSE C 0X 000X

• Length	up to 12	m (overlapping on demand)
• Width	100	cm
• Height	23+32+S	mm (S up to 120 mm)



PUR POLYURETHANE

PIR POLYISOCYANURATE
Disponibile a richiesta
Available upon request
(non / not standard)

B ROOF
PIR 30 -100
B_{roof} T3

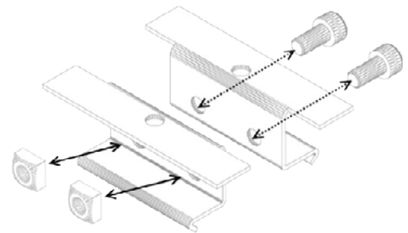
PIR B-s2,d0
classe

Dimensional features of bracket

Measurements Mounting bracket - TSE C 0Y 000Y

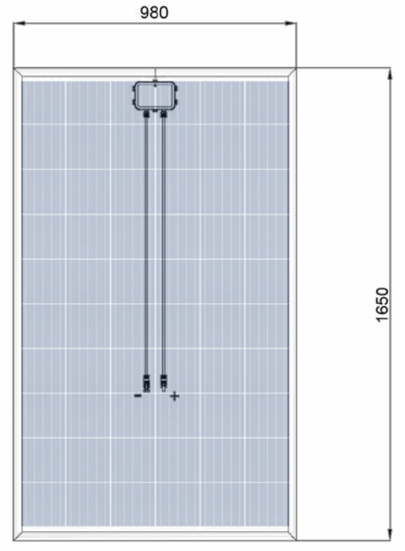
• Length	78	mm
• Width	33	mm
• Height	22	mm

Assemble 2 brackets with 2 M6x16 and 2 M6 square nuts on the corrugated profile of the dovetail panel



Measurements Photovoltaic module VE160PVER

• Length	1650	mm
• Width	980	mm
• Height	14	mm
• Weight	17,5	kg
• Anodised or coated aluminium frame (possibility of SEASIDE QUALICOAT)		
• Glass thickness	3,2	mm



MADE IN ITALY

GruppoSTG Fabbrica Srl
T +39 035-0510171 | M info@gruppostg.com | W www.gruppostg.com