

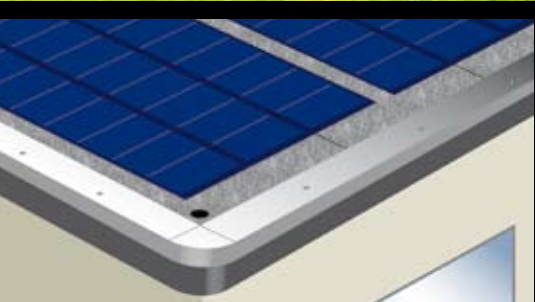


GENERAL SOLAR PV

STOPPING THE WATER. CATCHING THE SUN.

"We as individuals, are obliged to do something, even if it appears worthless. If switching off the light coming out of a room doesn't seem important, it doesn't mean that we don't have to do it."

14th Dalai Lama



**INTEGRATED ROOFING SYSTEM FOR
WATERPROOF AND ENERGY PRODUCTION**

GENERAL
MEMBRANE

GENERAL SOLAR PV

Nearly half of the **energy** of the world is generated from non-renewable fossil fuels and this is the main cause of CO2 emissions into the atmosphere. The **Kyoto agreement** established that at least the 20% of this energy must be made using **renewable sources by 2020**. The way to go is still long but **General SOLAR PV** helps to achieve this ambitious environmental target, allowing for the exploitation of spaces, i.e. the roofs, un-used until now, in an easy and safe way for the production of **clean electrical energy**.



GENERAL SOLAR PV IS THE NEW RANGE OF BITUMINOUS PHOTOVOLTAIC WATERPROOFING FLEXIBLE MEMBRANES, CAPABLE OF PRODUCING ELECTRIC ENERGY IN BOTH FLAT AND SLOPED ROOFS IN NEW OR REMEDIAL ROOFING. WATERPROOFING HAS UNTIL NOW BEEN THE MISSION PURSUED BY GENERAL MEMBRANE, WHEREAS TODAY THIS MISSION HAS BEEN ENLARGED: TO UTILISE THE SUN.

WATERPROOF

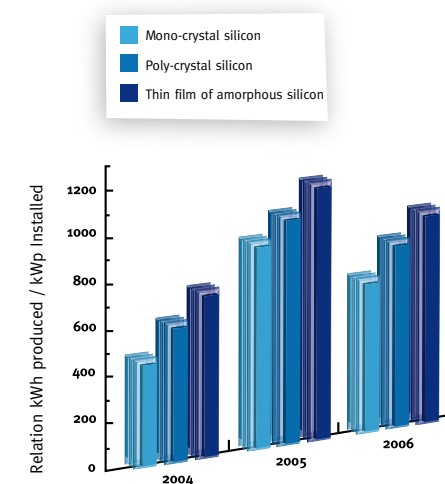
General SOLAR PV is a high performance waterproofing system, exclusively utilising **PHOENIX SOLAR** membranes. These membranes are made with special polymeric modifiers of very high quality, giving excellent resistance to the ageing and exceptional resistance to heat absorption associated with solar gain. The system is securely fixed to the roof by conventional means but special attention is request for the dimensional stability of the system and its wind lift up resistance. The underlay will be Phoenix Solar and the insulation, where required, can consist of PIR, rockwool or other materials having working temperature higher than 85°C. In the case of different materials (i.e.EPS) it will be protected with a recovery board of either CORK, PERLITE or FIBREBOARD to resist the extra heat gain the roof will be subjected to.

PHOTOVOLTAIC

The photovoltaic waterproofing membranes **General SOLAR PV** utilises the technology of solar cells in **amorphous silicon made of a thin film triple layer fusion**. The blue, green and red component of the solar light spectrum is absorbed in a refracted way by the three different layers. For this reason the **highest productivity of energy is obtained compared to the traditional rigid systems** in poly or single crystal silicon, especially in conditions with low levels of natural light, of indirect light or in conditions where light is obscured by cloud or mist etc. Furthermore the production of clean energy is improved by the effect of solar gain on the roof, which increases the working temperature of the whole waterproofing system, thereby giving a better performance when compared against traditional systems when viewed over a period of a year.

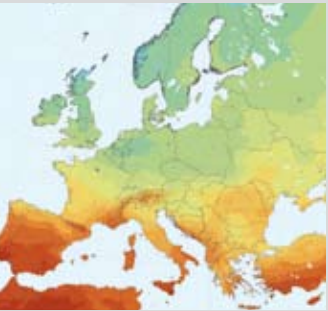
The photovoltaic cells of **General SOLAR PV** are very **light** (3, 5 kg/sq.m.) **shatter proof** and **resistant to hail** (they are not coated with glass but with cellular anti-stick and self-cleaning Teflon), they are flexible and therefore perfectly suitable for the use on all kinds of roofs, **without any particular requirement** regarding orientation, inclination, shading, supports / plinths or ventilation. The **longevity** of the cells is **exceptional**, and the by-passing integrated diodes in **General SOLAR PV** are connected to every single cell, allowing the modules to produce electricity even when they are dirty or heavily shaded.

THE **GENERAL SOLAR PV** SYSTEM IS BETTER THAN TRADITIONAL PHOTOVOLTAIC ALTERNATIVES, WHICH DISREGARD THE WATERPROOFING OF THE ROOF ON WHICH THEY ARE INSTALLED. OUR AIM **TO WATERPROOF AND THERMALLY INSULATE** A ROOF, IS NOW **COMBINED** WITH AN ADVANTAGE OF **CLEAN ELECTRICAL ENERGY PRODUCTION**.



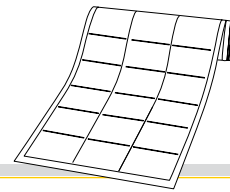
Year's production of electric energy related to the kWp installed using several different technologies.
(Source Office for the energy saving Bozen - ITALY)

GENERAL
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GENERAL SOLAR PV

A COMPLETE RANGE OF WATERPROOFING PHOTOVOLTAIC MODULES FOR AN OPTIMAL USE OF THE SPACE AVAILABLE ON THE ROOF.

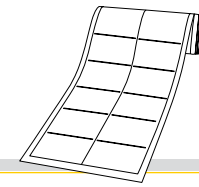


GENERAL SOLAR PV 408

408 Wp per module

GENERAL SOLAR PV 204

204 Wp per module



GENERAL SOLAR PV 272

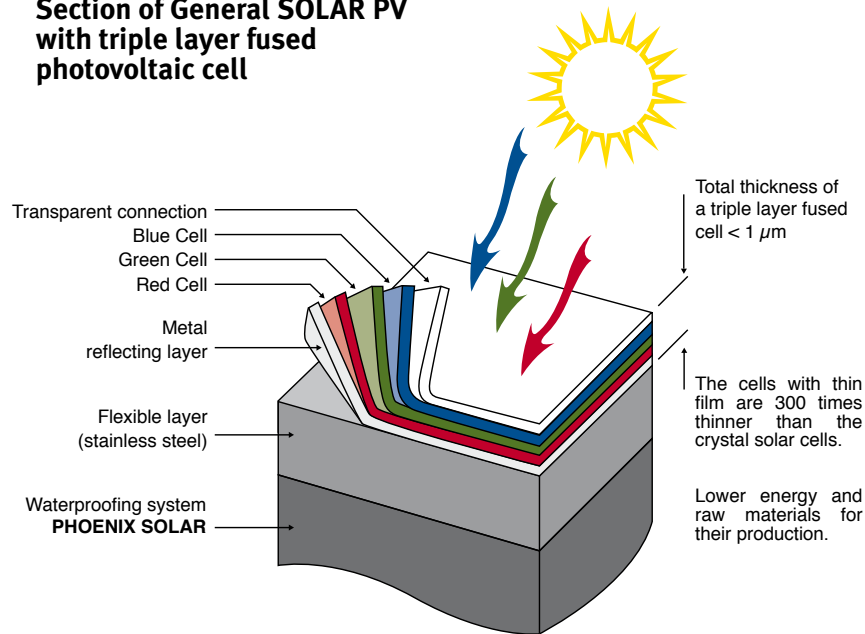
272 Wp per module

GENERAL SOLAR PV 136

136 Wp per module



Section of General SOLAR PV with triple layer fused photovoltaic cell



A COMPLETE SYSTEM

General SOLAR PV is a **unique and integrated solution** for the essential needs of a roof: high quality waterproofing, thermal insulation meeting local standards and efficient production of clean electrical energy.

PERFECT ARCHITECTURAL INTEGRATION AND HIGHEST GOVERNEMENT INCENTIVES

The perfect integration of General SOLAR PV on the roof achieves the **highest economical advantages** in terms of tax incentives and grants that may be available locally. The system is suitable for use in the **Public** and **Private** sectors.

EXAMPLE OF YIELD

Proposed on the installation of General SOLAR PV of 200 kWp on roof of 4500 sq.m, simulation for three climatic areas.

	LONDON	ROME	CAIRO
Power installed – A	200 kWp	200 kWp	200 kWp
Yield per climatic zone – B	799 kWh	1260 kWh	1578 kWh
Year production – AxB	159.800 kWh	252.000 kWh	315.600 kWh



WITHOUT GLASS



RESISTANT TO THE HAIL AND PEDESTRIAN



LIGHT



FLEXIBLE



ELEVATED YIELD TO THE HIGH TEMPERATURES



TOLERANCE TO THE SHADING

GENERAL SOLAR PV 408

408 Wp per module - 3 long stripes
measures: **5486 x 1200 x 7 mm** - area: **6,58 mq**

GENERAL SOLAR PV 272

272 Wp per module - 2 long stripes
measures: **5486 x 800 x 7 mm** - area: **4,39 mq**

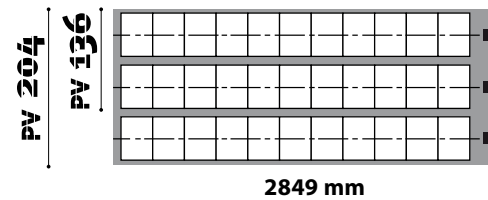


GENERAL SOLAR PV 204

204 Wp per module - 3 short stripes
measures: **2849 x 1200 x 7 mm** - area: **3,42 mq**

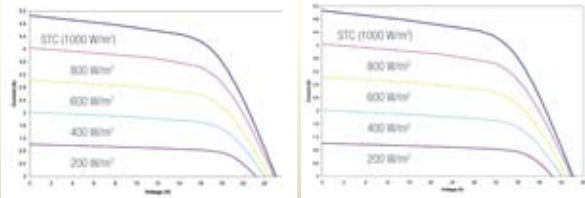
GENERAL SOLAR PV 136

136 Wp per module - 2 short stripes
measures: **2849 x 800 x 7 mm** - area: **2,28 mq**



Technical data sheet for the Solar cells UNI-SOLAR® with amorphous silicon triple layer fused cell	1 stripe long 5846 mm - 22 cells		1 short stripe 2849 mm - 11 cells	
	Specification STC	Specification NOTC	Specification STC	Specification NOTC
Maximum power (P _{max}):	136 Wp	105 Wp	68 Wp	53 Wp
Production tolerance:	± 5%	± 5%	± 5%	± 5%
Voltage at P _{max} (V _{mp}):	33,0 v	30,8 v	16,5 v	15,4 v
Current at P _{max} (I _{mp}):	4,1 A	3,42 A	4,1 A	3,42 A
Short-circuit Current (I _{sc}):	5,1 A	4,1 A	5,1 A	4,1 A
Open-circuit voltage (V _{oc}):	46,2 V	42,2 V	23,1 V	21,1 V
Maximum Series Fuse Rating:	8 A	-	8 A	-
NOTC:	-	46°C	-	46°C
Temperature Coefficient At AM 1.5 1000w/sq.m. irradiance				
Temperature Coefficient of I _{sc} :	5,1 mA/K (0,10%/°C)		5,1 mA/K (0,10%/°C)	
Temperature Coefficient of V _{oc} :	-176 mV/K (-0,38%/°C)		-88 mV/K (-0,38%/°C)	
Temperature Coefficient of P _{max} :	-286 mW/K (-0,21%/°C)		-143 mW/K (-0,21%/°C)	
Temperature Coefficient of I _{mp} :	4,1 mA/K (0,10%/°C)		4,1 mA/K (0,10%/°C)	
Temperature Coefficient of V _{mp} :	-102 mV/K (-0,31%/°C)		51 mV/K (-0,31%/°C)	

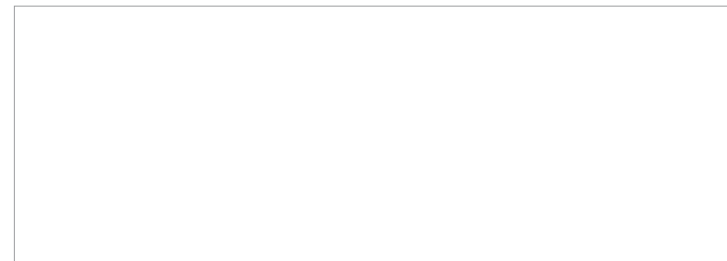
I-V Curves at various levels of irradiance
(With AM 1.5 and 25°C cell temperature)



Technical specification STC: condition of standard check – 1000 W/sq.m., AM1.5, temperature of the cells 25°C
Technical specification NOTC: Nominal Operating Cell Temperature 800 W/sq.m., AM1.5, 1m/sec. wind

UNI-SOLAR®
United Solar Ovonic

- Weight of the module: 7 kg/sq.m.
- Elevated production of energy even with high working temperature and low radiation (diffused light)
- 20 year warranty on Power output at 80%
- Output cables 560mm with rapid connections Multi-Contact®
- Solar cells triple junction amorphous silicon with thin film serially connected with bypass diodes for shadow tolerance and working even in case of damage of the single cell
- UL Listed to 600 VDC
- Meets IEC 61646 Requirements
- Upgrading of the technical data assured by the technical data sheets of the products



Notes:

1. During the first 8-10 weeks of operation, electrical output exceeds specified ratings. Power output may be higher by 15%, operating voltage may be higher by 11% and operating current may be higher by 4%.
2. Electric specifications (±5%) are based to measurement made in conditions of standard check (radiation power 1000 W/sq.m, AM1.5 temperature cells 25°C) after stabilization.
3. Actual performance may vary up to 10% from rated power due to low temperature operation, spectral and other related effects. Maximum system open-circuit voltage not to exceed 600 VDC per UL.
4. Specifications subject to change without notice.

GENERAL
MEMBRANE

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