



onyx
SOLAR

TECHNICAL GUIDE



This manual offers all the required information about the usage of the photovoltaic architectonic glazing manufactured by Onyx Solar. All instructions must be carefully read and the steps herein exposed must be followed. Onyx Solar will not be liable for any damages, losses or expenses due to the failure of complying with the conditions specified in this document.



El siguiente manual ofrece la información necesaria sobre el correcto diseño y uso del vidrio arquitectónico fotovoltaico fabricado por Onyx Solar. Por favor, lea la guía en su totalidad, y siga los pasos aquí expuestos. La empresa no se hace responsable de los daños, pérdidas o gastos derivados de la inadecuada aplicación de las condiciones establecidas en este documento.



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COMPANY INTRODUCTION

ONYX SOLAR: QUIÉNES SOMOS




ONYX SOLAR is a **leading design and manufacturing company offering architectonic photovoltaic glazing** that embodies the characteristics of the solar photovoltaic technology and the functionality of the traditional glazing; allowing the integration of photovoltaic properties on the surfaces of any building.

In this sense, Onyx offers a huge range of photovoltaic glazing that fulfills the highest quality standards of the Building Integrated Photovoltaic Industry (BIPV). At Onyx, the scope of our work covers from the design stage of the photovoltaic glazing to the manufacturing, installation process, testing and commissioning, achieving the optimal balance between aesthetics, energy production and the economics of the product. We always take in count the original ideas of the architect or designer team, and adding photovoltaic properties to the project and providing passive properties at the building. The goal is reach the optimal balance between aesthetics, power and efficiency of the product. Glass-glass modules represent a multifunctional bioclimatic solution which combines both active and passive properties such as UV and IR filter, acoustic and thermal insulation and solar protection: incoming light modulation and building's energy efficiency.

Onyx Solar, a firm with wide experience in the building integration photovoltaic solutions (BIPV), offers a full range of architectural and engineering consulting in design, manufacturing, and installation of photovoltaic constructive solutions.



 **ONYX SOLAR** es la **empresa líder en diseño y fabricación de vidrio arquitectónico fotovoltaico** que aunando las características eléctricas de la tecnología solar fotovoltaica y las características funcionales del vidrio como material arquitectónico tradicional, permiten la integración de los vidrios fotovoltaicos en cualquier parte de la envolvente del edificio.

En este sentido, Onyx Solar ofrece una amplia gama de módulos de vidrio fotovoltaicos que cumplen con los más altos estándares de calidad de la Integración Fotovoltaica en Edificios (BIPV). En Onyx, el alcance de nuestro trabajo cubre, desde la etapa de diseño del edificio mediante soluciones con vidrio fotovoltaico, su fabricación, el proceso de instalación, y la comprobación y puesta en marcha del sistema. Siempre buscando respetar las ideas originales del arquitecto autor del proyecto, pero añadiéndole las propiedades fotovoltaicas y potenciando las características pasivas de las construcciones con vidrio. La meta es alcanzar el equilibrio óptimo entre estética, producción de energía y eficiencia del producto. Los módulos de vidrio fotovoltaico representan una solución bioclimática multifuncional que combina propiedades activas y pasivas, como el filtro de rayos infrarrojos y ultravioletas, aislamiento acústico y térmico y protección solar: regulación de la luz entrante y eficiencia energética del edificio.

Onyx Solar, gracias a su amplísima experiencia en la integración fotovoltaica de edificios (BIPV), está en condiciones de ofrecer una gama completa de servicios de consultoría **de arquitectura e ingeniería** en el ámbito del diseño, fabricación, e instalación de soluciones constructivas fotov



PRODUCT INTRODUCTION

INTRODUCCIÓN AL PRODUCTO



ONYX SOLAR designs, manufactures and if necessary installs both aesthetic **crystalline and amorphous silicon photovoltaic glass/glass BIPV modules**. Technical data sheets and structural lay-out of Onyx's standard products are shown in the following pages, offering comprehensive information to ease the understanding of the fundamental objective of **the photovoltaic glazing's integration in the building envelope**.



ONYX SOLAR diseña, fabrica y en su caso, instala, **vidrios fotovoltaicos de tecnología de silicio cristalino y silicio amorfo**. En las siguientes páginas encontraras las fichas técnicas y el diseño estructural de los productos estándar de Onyx, ofreciendo una amplia información sobre las distintas alternativas desarrolladas por ONYX, para encontrar en cada la caso la mejor solución para la **integración fotovoltaica en la envolvente del edificio**.

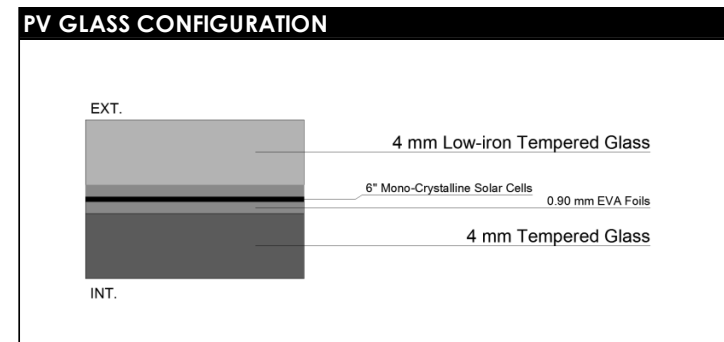
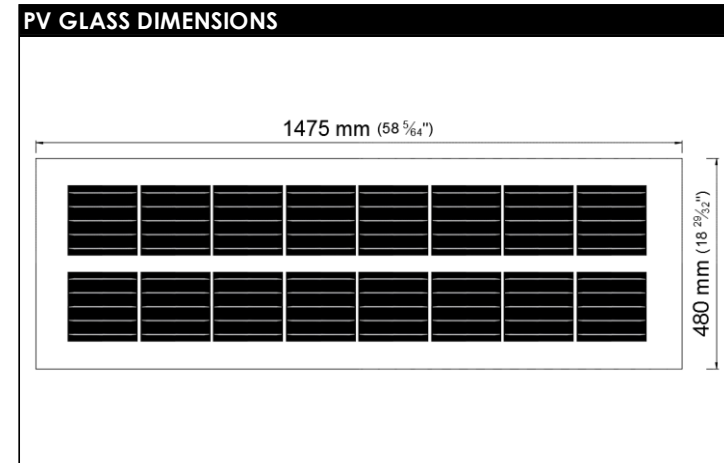


TECHNICAL DATA SHEETS: CRYSTALLINE PV GLASS

FICHAS TÉCNICAS: VIDRIO PV SILICIO CRISTALINO

| PHOTOVOLTAIC GLASS | | 1.475 x 480 | |
|---|--|-------------------------|--------------------|
| 044A0-14750480-43-M | | 6" Mono 158 | Crystalline |
| Electrical data test conditions (STC) | | | |
| Nominal peak power | 79 | P _{mpp} (Wp) | |
| Open-circuit voltage | 11 | V _{oc} (V) | |
| Short-circuit current | 9,41 | I _{sc} (A) | |
| Voltage at nominal power | 9 | V _{mpp} (V) | |
| Current at nominal power | 9,10 | I _{mpp} (A) | |
| Power tolerance not to exceed | ±10 | % | |
| STC: 1000 w/m ² , AM 15 and a cell temperature of 25°C, stabilized module state. | | | |
| Mechanical description | | | |
| Length | 1475 | mm | |
| Width | 480 | mm | |
| Thickness | 9,8 | mm | |
| Surface area | 0,71 | sqm | |
| Weight | 14 | Kgs | |
| Cell type | 6" Mono 158 | Crystalline | |
| No PV cells / Transparency degree | 16 | 43% | |
| Front Glass | 4 mm | Tempered Glass Low-Iron | |
| Rear Glass | 4 mm | Tempered Glass | |
| Thickness encapsulation | 1,80 mm | EVA Foils | |
| Category / Color code | | | |
| Junction Box | | | |
| Protection | IP65 | | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | | |
| Limits | | | |
| Maximum system voltage | 1000 | Vsys (V) | |
| Operating module temperature | -40...+85 | °C | |
| Temperature Coefficients | | | |
| Temperature Coefficient of P _{mpp} | -0,32 | %/°C | |
| Temperature Coefficient of V _{oc} | -0,28 | %/°C | |
| Temperature Coefficient of I _{sc} | 0,07 | %/°C | |

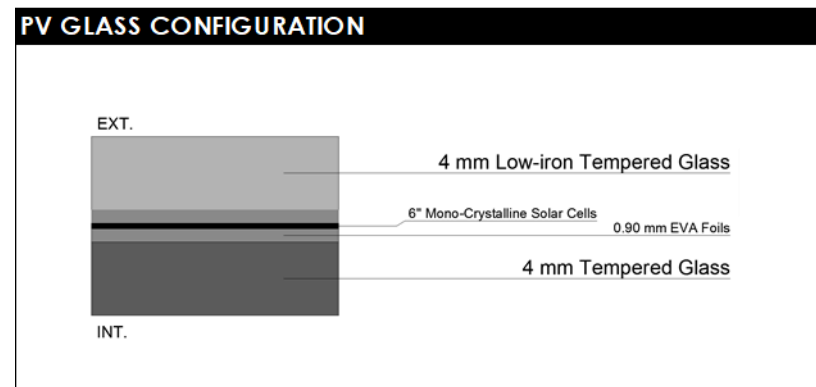
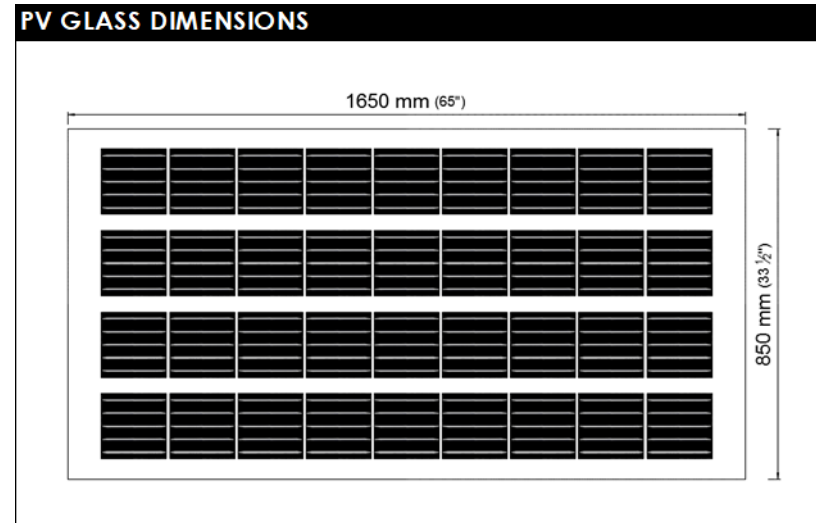
*All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|-------------------------|--------------|
| Light Transmission | 43% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 111,1 |

| PHOTOVOLTAIC GLASS | | 1.650 x 850 | |
|--|--|-------------------------|--|
| 044A0-16500850-35-M | | 6" Mono 158 Crystalline | |
| Electrical data test conditions (STC) | | | |
| Nominal peak power | 177 | P_{mpp} (Wp) | |
| Open-circuit voltage | 24 | V_{oc} (V) | |
| Short-circuit current | 9,41 | I_{sc} (A) | |
| Voltage at nominal power | 19 | V_{mpp} (V) | |
| Current at nominal power | 9,10 | I_{mpp} (A) | |
| Power tolerance not to exceed | ±10 | % | |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | | |
| Mechanical description | | | |
| Length | 1650 | mm | |
| Width | 850 | mm | |
| Thickness | 9,8 | mm | |
| Surface area | 1,40 | sqm | |
| Weight | 28 | Kgs | |
| Cell type | 6" Mono 158 | Crystalline | |
| No PV cells / Transparency degree | 36 | 35% | |
| Front Glass | 4 mm | Tempered Glass Low-Iron | |
| Rear Glass | 4 mm | Tempered Glass | |
| Thickness encapsulation | 1,80 mm | EVA Foils | |
| Category / Color code | | | |
| Junction Box | | | |
| Protection | IP65 | | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | | |
| Limits | | | |
| Maximum system voltage | 1000 | V_{sys} (V) | |
| Operating module temperature | -40...+85 | °C | |
| Temperature Coefficients | | | |
| Temperature Coefficient of P_{mpp} | -0,32 | %/°C | |
| Temperature Coefficient of V_{oc} | -0,28 | %/°C | |
| Temperature Coefficient of I_{sc} | 0,07 | %/°C | |

*All technical specifications are subject to change without notice by Onyx Solar

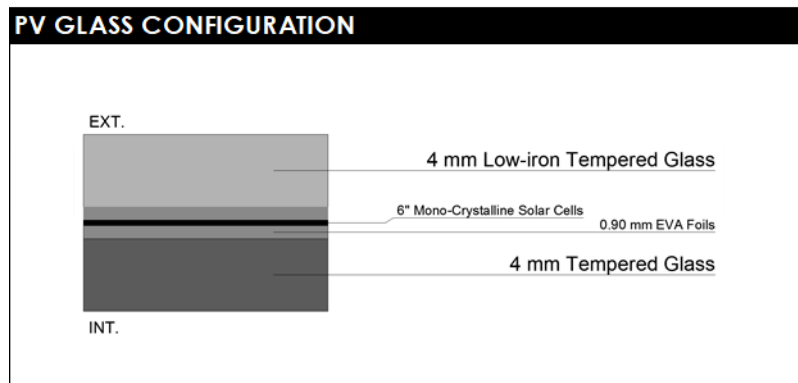
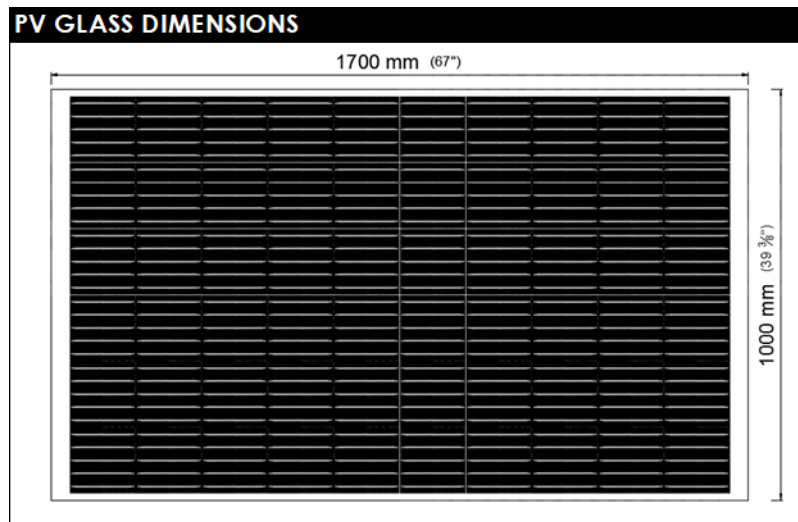


GLASS PROPERTIES

| | |
|---------------------|-------|
| Light Transmission | 35% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 126,2 |

| PHOTOVOLTAIC GLASS | | 1.700 x 1000 | |
|---|--|-------------------------|--|
| 044A0-17001000-11-M | | 6" Mono 158 Crystalline | |
| Electrical data test conditions (STC) | | | |
| Nominal peak power | 295 | P_{mpp} (Wp) | |
| Open-circuit voltage | 41 | V_{oc} (V) | |
| Short-circuit current | 9,41 | I_{sc} (A) | |
| Voltage at nominal power | 32 | V_{mpp} (V) | |
| Current at nominal power | 9,10 | I_{mpp} (A) | |
| Power tolerance not to exceed | ± 10 | % | |
| STC: 1000 w/m ² , AM 15 and a cell temperature of 25°C, stabilized module state. | | | |
| Mechanical description | | | |
| Length | 1700 | mm | |
| Width | 1000 | mm | |
| Thickness | 9,8 | mm | |
| Surface area | 1,70 | sqm | |
| Weight | 34 | Kgs | |
| Cell type | 6" Mono 158 | Crystalline | |
| No PV cells / Transparency degree | 60 | 11% | |
| Front Glass | 4 mm | Tempered Glass Low-Iron | |
| Rear Glass | 4 mm | Tempered Glass | |
| Thickness encapsulation | 1,80 mm | EVA Foils | |
| Category / Color code | | | |
| Junction Box | | | |
| Protection | IP65 | | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | | |
| Limits | | | |
| Maximum system voltage | 1000 | V_{sys} (V) | |
| Operating module temperature | -40...+85 | °C | |
| Temperature Coefficients | | | |
| Temperature Coefficient of Pmpp | -0,32 | %/°C | |
| Temperature Coefficient of Voc | -0,28 | %/°C | |
| Temperature Coefficient of Isc | 0,07 | %/°C | |

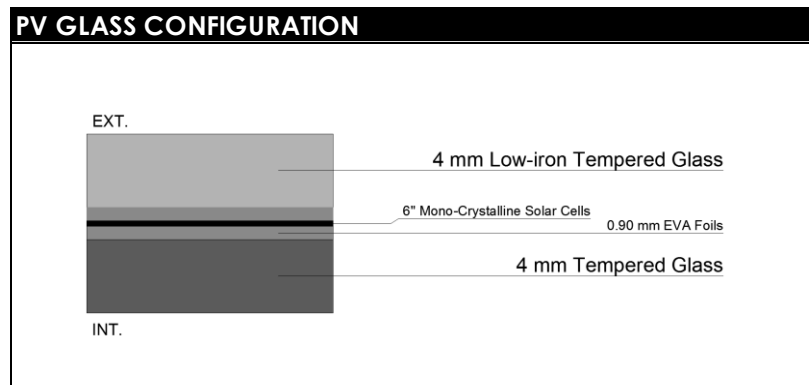
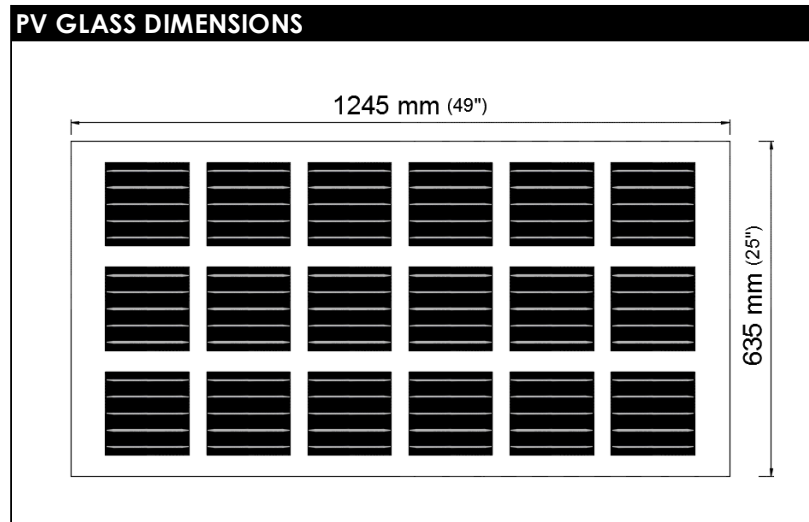
*All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|-------------------------|-------|
| Light Transmission | 11% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 173,5 |

| PHOTOVOLTAIC GLASS | | |
|--|--|-------------------------|
| 044A0-12450635-43-M | | |
| 1.245 x 635 | | |
| 6" Mono 158 Crystalline | | |
| Electrical data test conditions (STC) | | |
| Nominal peak power | 88 | P_{mpp} (Wp) |
| Open-circuit voltage | 12 | V_{oc} (V) |
| Short-circuit current | 9,41 | I_{sc} (A) |
| Voltage at nominal power | 10 | V_{mpp} (V) |
| Current at nominal power | 9,10 | I_{mpp} (A) |
| Power tolerance not to exceed | ±10 | % |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | |
| Mechanical description | | |
| Length | 1245 | mm |
| Width | 635 | mm |
| Thickness | 9,8 | mm |
| Surface area | 0,79 | sqm |
| Weight | 16 | Kgs |
| Cell type | 6" Mono 158 | Crystalline |
| No PV cells / Transparency degree | 18 | 43% |
| Front Glass | 4 mm | Tempered Glass Low-Iron |
| Rear Glass | 4 mm | Tempered Glass |
| Thickness encapsulation | 1,80 mm | EVA Foils |
| Category / Color code | | |
| Junction Box | | |
| Protection | IP65 | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | |
| Limits | | |
| Maximum system voltage | 1000 | V_{sys} (V) |
| Operating module temperature | -40...+85 | °C |
| Temperature Coefficients | | |
| Temperature Coefficient of P_{mpp} | -0,32 | %/°C |
| Temperature Coefficient of V_{oc} | -0,28 | %/°C |
| Temperature Coefficient of I_{sc} | 0,07 | %/°C |

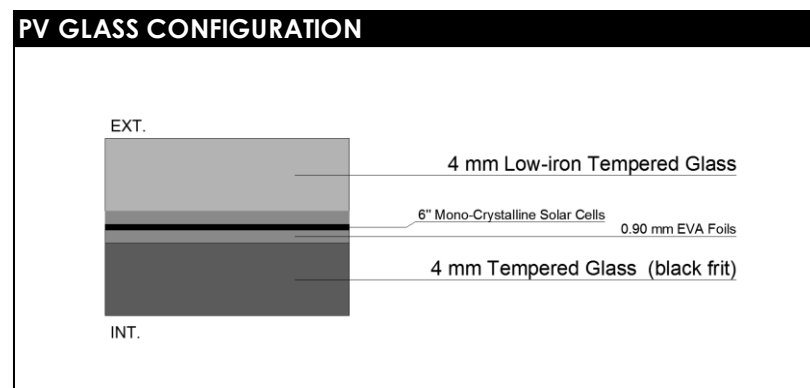
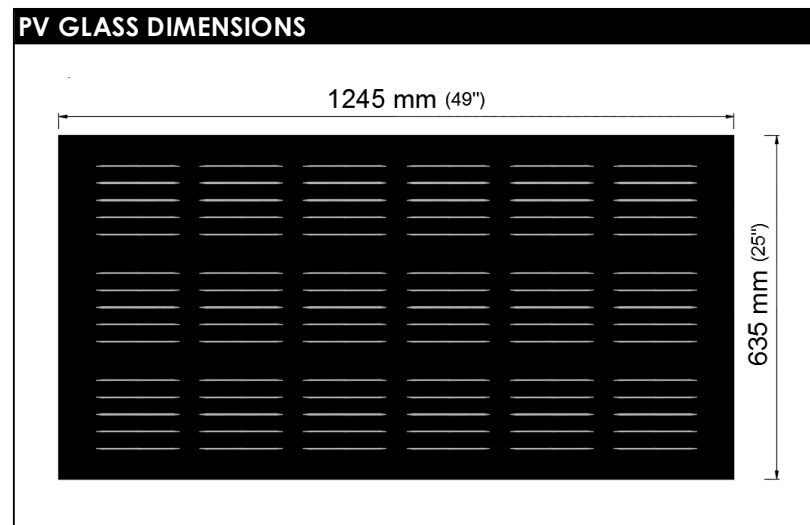
* All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|-------------------------|-------|
| Light Transmission | 43% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 111,9 |

| PHOTOVOLTAIC GLASS | | |
|---|--|-----------------------------|
| 044A0-12450635-00-M | 1.245 x 635 | 6" Mono 158 Crystalline |
| Electrical data test conditions (STC) | | |
| Nominal peak power | 88 | P_{mpp} (Wp) |
| Open-circuit voltage | 12 | V_{oc} (V) |
| Short-circuit current | 9,41 | I_{sc} (A) |
| Voltage at nominal power | 10 | V_{mpp} (V) |
| Current at nominal power | 9,10 | I_{mpp} (A) |
| Power tolerance not to exceed | ±10 | % |
| STC: 1000 w/m ² , AM 15 and a cell temperature of 25°C, stabilized module state. | | |
| Mechanical description | | |
| Length | 1245 | mm |
| Width | 635 | mm |
| Thickness | 9,8 | mm |
| Surface area | 0,79 | sqm |
| Weight | 16 | Kgs |
| Cell type | 6" Mono 158 | Crystalline |
| No PV cells / Transparency degree | 18 | 0% |
| Front Glass | 4 mm | Tempered Glass Low-Iron |
| Rear Glass | 4 mm | Tempered Glass (black frit) |
| Thickness encapsulation | 1,80 mm | EVA Foils |
| Category / Color code | | |
| Junction Box | | |
| Protection | IP65 | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | |
| Limits | | |
| Maximum system voltage | 1000 | V_{sys} (V) |
| Operating module temperature | -40...+85 | °C |
| Temperature Coefficients | | |
| Temperature Coefficient of P_{mpp} | -0,32 | %/°C |
| Temperature Coefficient of V_{oc} | -0,28 | %/°C |
| Temperature Coefficient of I_{sc} | 0,07 | %/°C |

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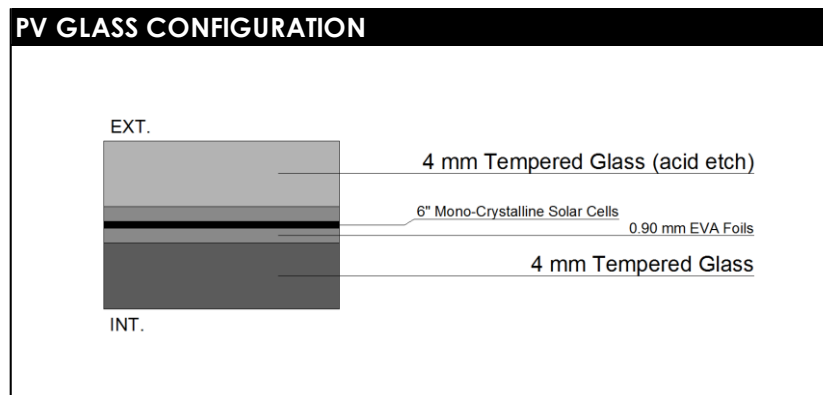
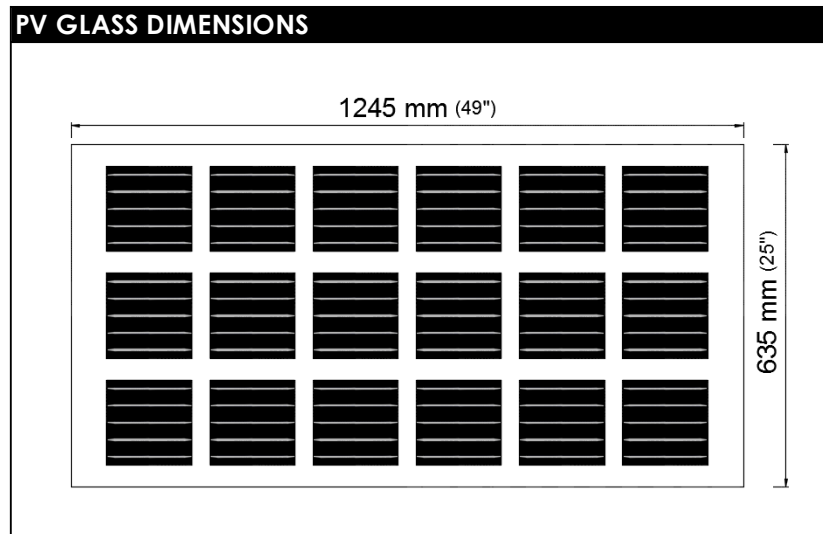


| GLASS PROPERTIES | |
|-------------------------|-------|
| Light Transmission | 0% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 111,9 |



| PHOTOVOLTAIC GLASS | | |
|--|--|----------------------------|
| 044AA-12450635-43-M | | |
| 1.245 x 635 | | |
| 6" Mono 158 Crystalline | | |
| Electrical data test conditions (STC) | | |
| Nominal peak power | 81 | P_{mpp} (Wp) |
| Open-circuit voltage | 12 | V_{oc} (V) |
| Short-circuit current | 8,66 | I_{sc} (A) |
| Voltage at nominal power | 10 | V_{mpp} (V) |
| Current at nominal power | 8,38 | I_{mpp} (A) |
| Power tolerance not to exceed | ±10 | % |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | |
| Mechanical description | | |
| Length | 1245 | mm |
| Width | 635 | mm |
| Thickness | 9,8 | mm |
| Surface area | 0,79 | sqm |
| Weight | 16 | Kgs |
| Cell type | 6" Mono 158 | Crystalline |
| No PV cells / Transparency degree | 18 | 43% |
| Front Glass | 4 mm | Tempered Glass (acid etch) |
| Rear Glass | 4 mm | Tempered Glass |
| Thickness encapsulation | 1,80 mm | EVA Foils |
| Category / Color code | | |
| Junction Box | | |
| Protection | IP65 | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | |
| Limits | | |
| Maximum system voltage | 1000 | V_{sys} (V) |
| Operating module temperature | -40...+85 | °C |
| Temperature Coefficients | | |
| Temperature Coefficient of P_{mpp} | -0,32 | %/°C |
| Temperature Coefficient of V_{oc} | -0,28 | %/°C |
| Temperature Coefficient of I_{sc} | 0,07 | %/°C |

* All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|-------------------------|-------|
| Light Transmission | 43% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 103,0 |



TECHNICAL DATA SHEETS: AMORPHOUS SILICON PV GLASS

FICHAS TÉCNICAS: VIDRIO FV SILICIO AMORFO



The nominal power of SF PV modules indicates the power generated under Standard Test Conditions (STC). Photovoltaic modules may produce more current and/or voltage under actual operating conditions than in Standard Test Conditions. The electrical characteristics are within $\pm 10\%$ of the indicated Isc and Voc values under STC. Electrical parameters, shown in the data sheet are considered after light-soaking degradation process. The uncertainty of the measurements can be established in $\pm 4,72\%$.



La potencia nominal de los vidrios fotovoltaicos indica la potencia generada bajo pruebas en condiciones estándar (STC). Los vidrios fotovoltaicos pueden producir más corriente y/o voltaje bajo condiciones de funcionamiento real que bajo condiciones estándar. Las características eléctricas están dentro de un $\pm 10\%$ de los valores de Isc y Voc indicados en el STC. Los parámetros eléctricos mostrados en las fichas técnicas se consideran después de *Light-Soaking Effect*. La incertidumbre en las mediciones puede establecerse en un $\pm 4,72\%$.



| PHOTOVOLTAIC GLASS | | 034_N-12450300-_-_- | | | |
|---------------------------------------|----------------|---------------------|----------------|----------------|-----------------|
| 1245 x 300 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mpp} (Wp) | 21 | 15 | 13 | 10 |
| Open-circuit voltage | V_{oc} (V) | 23 | 23 | 23 | 23 |
| Short-circuit current | I_{sc} (A) | 1,50 | 1,15 | 0,97 | 0,77 |
| Voltage at nominal power | V_{mpp} (V) | 16 | 16 | 16 | 16 |
| Current at nominal power | I_{mp} (A) | 1,34 | 0,93 | 0,79 | 0,65 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

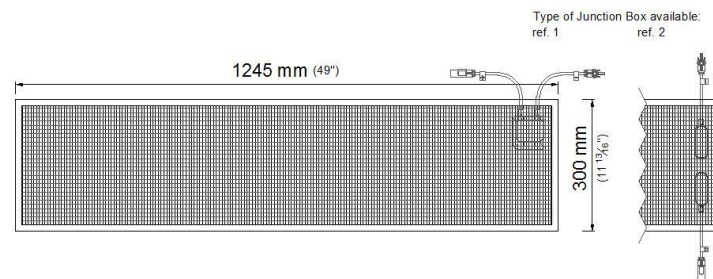
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|--------------------------|
| Length | mm 1245 |
| Width | mm 300 |
| Thickness | mm 8,10 (EVA) 8,72 (PVB) |
| Surface area | sqm 0,37 |
| Weight | Kg 6,00 |
| Cell type | α-Si Thin Film |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 4,0 mm Float Glass |
| Thickness encapsulation | ref. A 0,90 mm EVA Foils |
| | ref. B 1,52 mm PVB Foils |

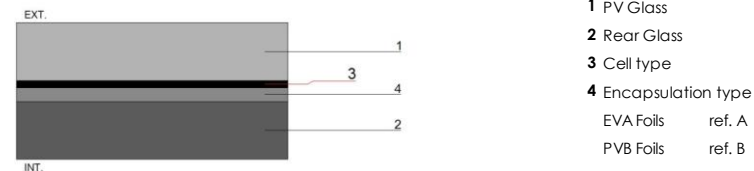
| Junction Box | |
|--------------------------------------|---------------------|
| Protection | IP65 |
| Wiring Section | 2,5 mm² / 4,0 mm² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mpp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

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PV GLASS DIMENSIONS

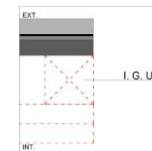


PV GLASS CONFIGURATION



NOTES

- * For optical and further mechanical properties, please go to: **Technical Guide. 7.-Other Properties.**
- * Optional: Insulating Glass Unit. U value (W/sqm.K), please go to: **Technical Guide. 8.-Insulating Glass Unit.**
- * Junction box type and location should be approved by the customer.



| PHOTOVOLTAIC GLASS | | 034_N-12000600-_-_- | | | |
|---------------------------------------|---------------|---------------------|----------------|----------------|-----------------|
| 1200 x 600 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mp} (Wp) | 41 | 29 | 24 | 20 |
| Open-circuit voltage | V_{oc} (V) | 47 | 47 | 47 | 47 |
| Short-circuit current | I_{sc} (A) | 1,45 | 1,11 | 0,93 | 0,74 |
| Voltage at nominal power | V_{mp} (V) | 32 | 32 | 32 | 32 |
| Current at nominal power | I_{mp} (A) | 1,29 | 0,90 | 0,76 | 0,63 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

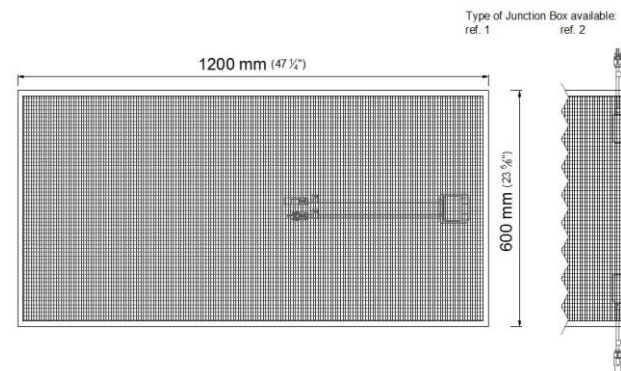
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|---------------------------|
| Length | mm 1200 |
| Width | mm 600 |
| Thickness | mm 8,10 (EVA), 8,72 (PVB) |
| Surface area | sqm 0,72 |
| Weight | Kg 11,52 |
| Cell type | α-Si Thin Film |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 4,0 mm Float Glass |
| Thickness encapsulation | ref. A 0,90 mm EVA Foils |
| | ref. B 1,52 mm PVB Foils |

| Junction Box | |
|-------------------------------------|---|
| Protection | IP65 |
| Wiring Section | 2,5 mm ² / 4,0 mm ² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS

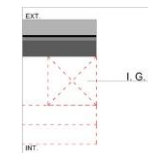


PV GLASS CONFIGURATION



NOTES

- * For optical and further mechanical properties, please go to: **Technical Guide. 7.-Other Properties.**
- * Optional: Insulating Glass Unit. U value (W/sqm.K), please go to: **Technical Guide. 8.-Insulating Glass Unit.**
- * Junction box type and location should be approved by the customer.



| PHOTOVOLTAIC GLASS | | 034_N-12450635-_-_- | | | |
|---------------------------------------|----------------|---------------------|----------------|----------------|-----------------|
| 1245 x 635 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mpp} (Wp) | 46 | 32 | 27 | 22 |
| Open-circuit voltage | V_{oc} (V) | 50 | 50 | 50 | 50 |
| Short-circuit current | I_{sc} (A) | 1,50 | 1,15 | 0,97 | 0,77 |
| Voltage at nominal power | V_{mpp} (V) | 34 | 34 | 34 | 34 |
| Current at nominal power | I_{mp} (A) | 1,34 | 0,93 | 0,79 | 0,65 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

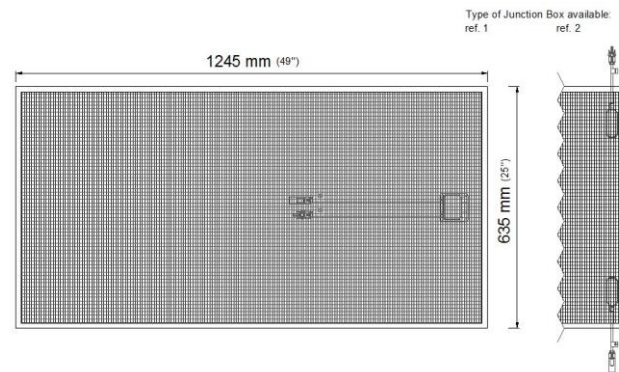
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|--------------------------|
| Length | mm 1245 |
| Width | mm 635 |
| Thickness | mm 8,10 (EVA) 8,72 (PVB) |
| Surface area | sqm 0,79 |
| Weight | Kg 14,20 |
| Cell type | α-Si Thin Film |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 4,0 mm Float Glass |
| Thickness encapsulation | ref. A 0,90 mm EVA Foils |
| | ref. B 1,52 mm PVB Foils |

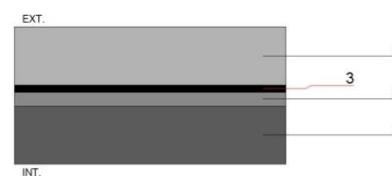
| Junction Box | |
|--------------------------------------|---------------------|
| Protection | IP65 |
| Wiring Section | 2,5 mm² / 4,0 mm² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mpp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



PV GLASS CONFIGURATION



- 1 PV Glass
 - 2 Rear Glass
 - 3 Cell type
 - 4 Encapsulation type
- PVB Foils ref. B

NOTES

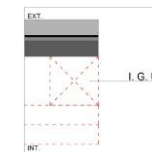
* For optical and further mechanical properties, please go to:

Technical Guide. 7.-Other Properties.

* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:

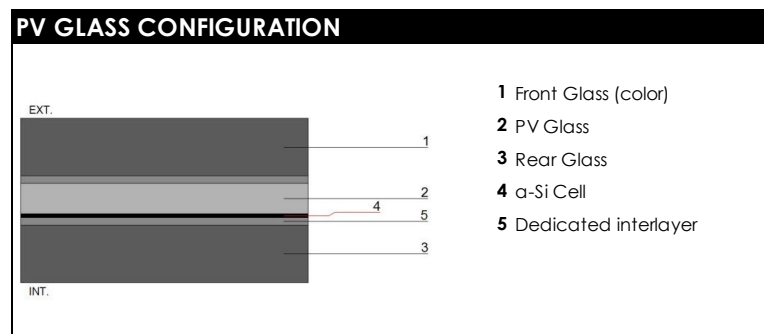
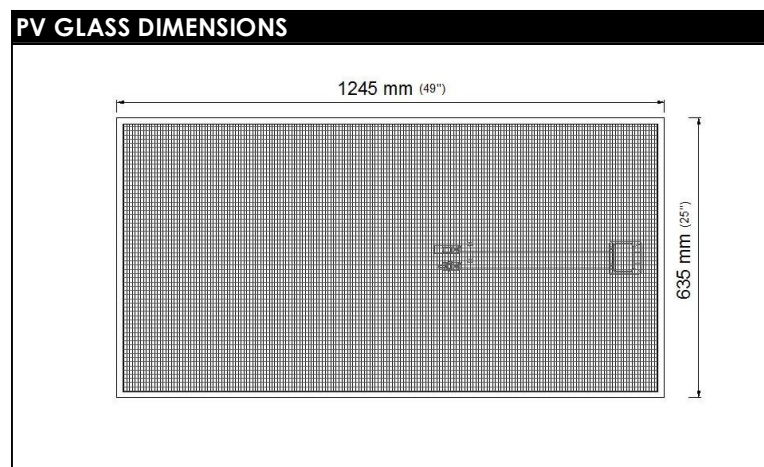
Technical Guide. 8.-Insulating Glass Unit.

* Junction box type and location should be approved by the customer.



| PHOTOVOLTAIC GLASS | | |
|--|--|------------------------|
| | 1245 x 635 | |
| | Dark | Clear-0% |
| Electrical data test conditions (STC) | | |
| Nominal peak power | 40 | P_{mpp} (Wp) |
| Open-circuit voltage | 50 | V_{oc} (V) |
| Short-circuit current | 1.31 | I_{sc} (A) |
| Voltage at nominal power | 34 | V_{mpp} (V) |
| Current at nominal power | 1.17 | I_{mpp} (A) |
| Power tolerance not to exceed | ± 5 | % |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | |
| Mechanical description | | |
| Length | 1245 | mm |
| Width | 635 | mm |
| Thickness | 12.7 | mm |
| Surface area | 0.79 | sqm |
| Weight | 25 | Kgs |
| Cell type | α -Si | Thin Film |
| Transparency degree | Dark | Clear-0% |
| Front Glass | 4 mm | Tempered Glass (color) |
| PV Active Glass | 3,2 mm | Float Glass |
| Rear Glass | 4 mm | Tempered Glass |
| Thickness encapsulation | 1,5 mm | Dedicated Interlayer |
| Category / Color code | | |
| Junction Box | | |
| Protection | IP65 | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | |
| Limits | | |
| Maximum system voltage | 1000 | V_{sys} (V) |
| Operating module temperature | -40...+85 | °C |
| Temperature Coefficients | | |
| Temperature Coefficient of Pmpp | -0,19 | %/°C |
| Temperature Coefficient of Voc | -0,28 | %/°C |
| Temperature Coefficient of Isc | +0,09 | %/°C |

* All technical specifications are subject to change without notice by Onyx Solar

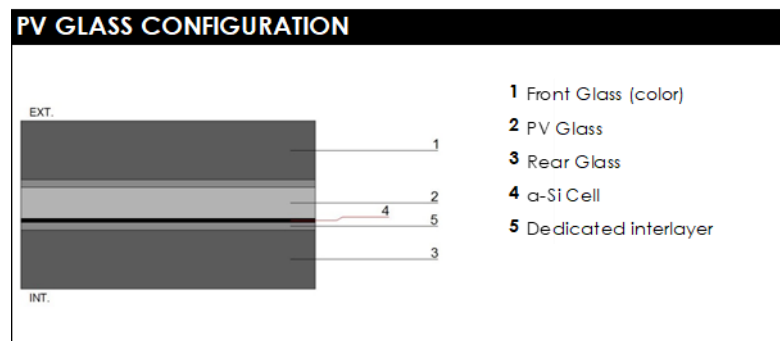
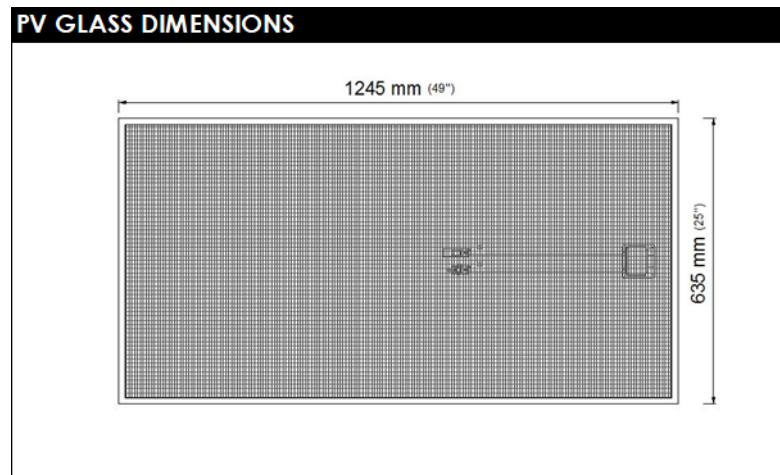


| GLASS PROPERTIES | Onyx Equivalent Glass |
|-------------------------|------------------------------|
| Solar Factor/SHGC | 23.00% |
| Light Transmission | 0.00% |
| UV Transmission | < 1% |
| Light Reflection | 8% |
| U-value [W/sqm.K] | 5.2 |
| Peak Power [Wp/sqm] | 50.1 |



| PHOTOVOLTAIC GLASS | | 1245 x 635 | |
|--|--|------------------------|---------------------|
| | | L | Vision (20%) |
| Electrical data test conditions (STC) | | | |
| Nominal peak power | 23 | P_{mpp} (Wp) | |
| Open-circuit voltage | 50 | V_{oc} (V) | |
| Short-circuit current | 0.84 | I_{sc} (A) | |
| Voltage at nominal power | 34 | V_{mpp} (V) | |
| Current at nominal power | 0.69 | I_{mpp} (A) | |
| Power tolerance not to exceed | ±5 | % | |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | | |
| Mechanical description | | | |
| Length | 1245 | mm | |
| Width | 635 | mm | |
| Thickness | 12.7 | mm | |
| Surface area | 0.79 | sqm | |
| Weight | 25 | Kgs | |
| Cell type | α-Si | Thin Film | |
| Transparency degree | L | Vision (20%) | |
| Front Glass | 4 mm | Tempered Glass (color) | |
| PV Active Glass | 3,2 mm | Float Glass | |
| Rear Glass | 4 mm | Tempered Glass | |
| Thickness encapsulation | 1,5 mm | Dedicated Interlayer | |
| Category / Color code | | | |
| Junction Box | | | |
| Protection | IP65 | | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | | |
| Limits | | | |
| Maximum system voltage | 1000 | V_{sys} (V) | |
| Operating module temperature | -40...+85 | °C | |
| Temperature Coefficients | | | |
| Temperature Coefficient of Pmpp | -0,19 | %/°C | |
| Temperature Coefficient of Voc | -0,28 | %/°C | |
| Temperature Coefficient of Isc | +0,09 | %/°C | |

*All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | Onyx Equivalent Glass |
|----------------------------|------------------------------|
| Solar Factor/SHGC | 32.00% |
| Light Transmission | 16.30% |
| UV Transmission | < 1% |
| Light Reflection | 8% |
| U-value [W/sqm.K] | 5.2 |
| Peak Power [Wp/sqm] | 29.6 |



| PHOTOVOLTAIC GLASS | | 636BN-12451242-_-_- | | | |
|---------------------------------------|----------------|---------------------|----------------|----------------|-----------------|
| 1245 x 1242 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | | | | |
| | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mpp} (Wp) | 90 | 62 | 53 | 44 |
| Open-circuit voltage | V_{oc} (V) | 97 | 97 | 97 | 97 |
| Short-circuit current | I_{sc} (A) | 1,50 | 1,15 | 0,97 | 0,77 |
| Voltage at nominal power | V_{mpp} (V) | 67 | 67 | 67 | 67 |
| Current at nominal power | I_{mp} (A) | 1,34 | 0,93 | 0,79 | 0,65 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

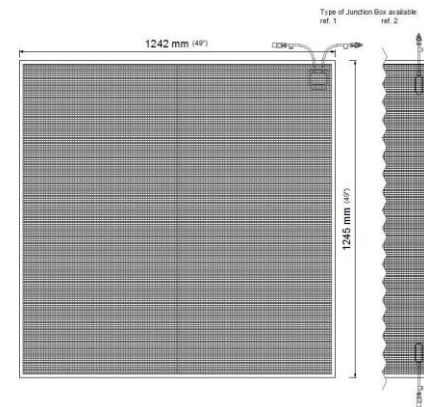
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|----------------------------------|
| Length | mm 1245 |
| Width | mm 1242 |
| Thickness | mm 16,72 / 14,72 / 12,72 |
| Surface area | sqm 1,55 |
| Weight | Kg 58,9 / 51,2 / 43,4 |
| Cell type | α-Si Thin Film |
| Front Glass | 6 / 5 / 4 mm Tempered Glass |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 6 / 5 / 4 mm Tempered Glass |
| Thickness encapsulation | ref. A EVA Foils (not available) |
| | ref. B 1,52 mm PVB Foils |

| Junction Box | |
|--------------------------------------|---|
| Protection | IP65 |
| Wiring Section | 2,5 mm ² / 4,0 mm ² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mpp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

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PV GLASS DIMENSIONS



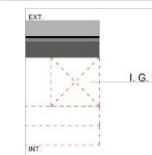
PV GLASS CONFIGURATION



- 1 Front Glass
 - 2 PV Glass
 - 3 Rear Glass
 - 4 Cell type
 - 5 Encapsulation type
- EVA Foils ref. A
PVB Foils ref. B

NOTES

- * For optical and further mechanical properties, please go to: **Technical Guide. 7.-Other Properties.**
- * Optional: Insulating Glass Unit. U value (W/sqm.K), please go to: **Technical Guide. 8.-Insulating Glass Unit.**
- * Junction box type and location should be approved by the customer.



| PHOTOVOLTAIC GLASS | | 636BN-24620635- _ _ _ | | | |
|---------------------------------------|----------------|-----------------------|----------------|----------------|-----------------|
| 2462 x 635 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | | | | |
| | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mpp} (Wp) | 90 | 63 | 53 | 44 |
| Open-circuit voltage | V_{oc} (V) | 50 | 50 | 50 | 50 |
| Short-circuit current | I_{sc} (A) | 2,97 | 2,27 | 1,92 | 1,52 |
| Voltage at nominal power | V_{mpp} (V) | 34 | 34 | 34 | 34 |
| Current at nominal power | I_{mp} (A) | 2,65 | 1,84 | 1,56 | 1,29 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

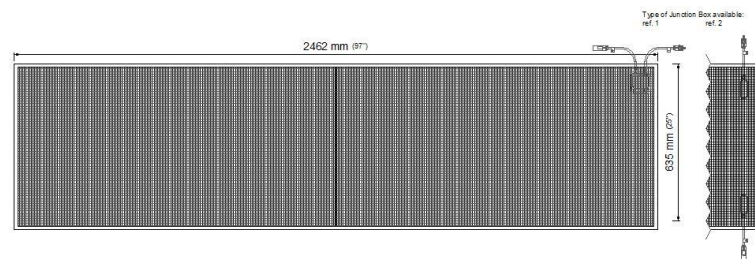
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|----------------------------------|
| Length | mm 2462 |
| Width | mm 635 |
| Thickness | mm 16,72 / 14,72 / 12,72 |
| Surface area | sqm 1,56 |
| Weight | Kg 58,9 / 51,2 / 43,4 |
| Cell type | α-Si Thin Film |
| Front Glass | 6 / 5 / 4 mm Tempered Glass |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 6 / 5 / 4 mm Tempered Glass |
| Thickness encapsulation | ref. A EVA Foils (not available) |
| | ref. B 1,52 mm PVB Foils |

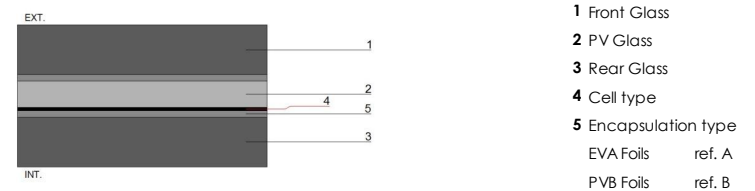
| Junction Box | |
|--------------------------------------|---------------------|
| Protection | IP65 |
| Wiring Section | 2,5 mm² / 4,0 mm² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mpp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

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PV GLASS DIMENSIONS

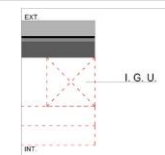


PV GLASS CONFIGURATION



NOTES

- * For optical and further mechanical properties, please go to: **Technical Guide. 7.-Other Properties.**
- * Optional: Insulating Glass Unit. U value (W/sqm.K), please go to: **Technical Guide. 8.-Insulating Glass Unit.**
- * Junction box type and location should be approved by the customer.



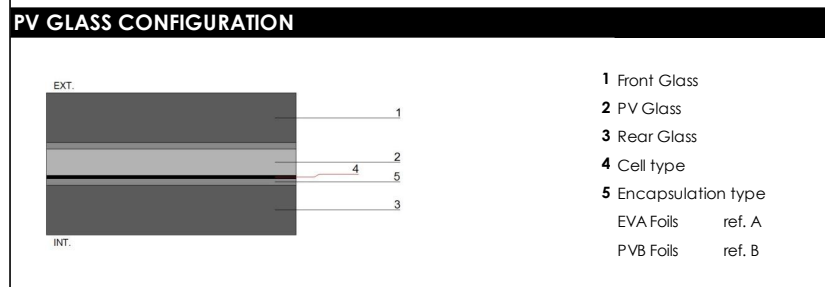
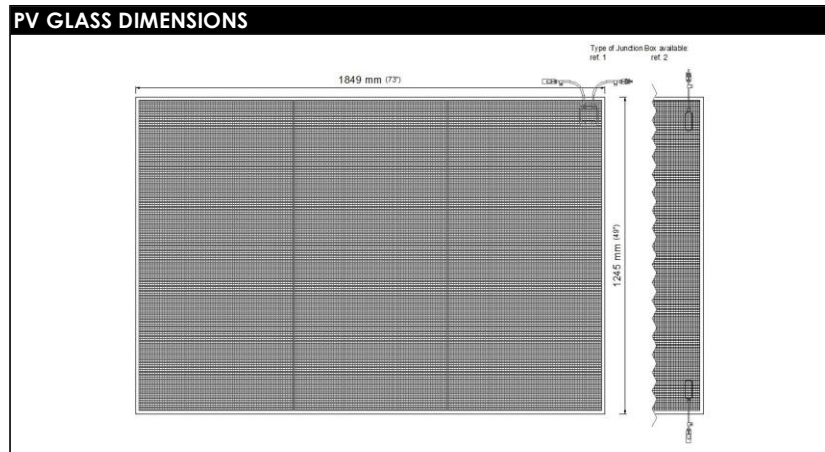
| PHOTOVOLTAIC GLASS | | 636BN-12451849-_-_- | | | |
|---------------------------------------|----------------|---------------------|----------------|----------------|-----------------|
| 1245 x 1849 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mpp} (Wp) | 133 | 92 | 78 | 64 |
| Open-circuit voltage | V_{oc} (V) | 144 | 144 | 144 | 144 |
| Short-circuit current | I_{sc} (A) | 1,50 | 1,15 | 0,97 | 0,77 |
| Voltage at nominal power | V_{mpp} (V) | 99 | 99 | 99 | 99 |
| Current at nominal power | I_{mp} (A) | 1,34 | 0,93 | 0,79 | 0,65 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|----------------------------------|
| Length | mm 1245 |
| Width | mm 1849 |
| Thickness | mm 16,72 / 14,72 / 12,72 |
| Surface area | sqm 2,30 |
| Weight | Kg 87,4 / 75,9 / 64,4 |
| Cell type | α-Si Thin Film |
| Front Glass | 6 / 5 / 4 mm Tempered Glass |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 6 / 5 / 4 mm Tempered Glass |
| Thickness encapsulation | ref. A EVA Foils (not available) |
| | ref. B 1,52 mm PVB Foils |

| Junction Box | |
|--------------------------------------|---------------------|
| Protection | IP65 |
| Wiring Section | 2,5 mm² / 4,0 mm² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mpp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

* All technical specifications are subject to change without notice by Onyx Solar



NOTES

- * For optical and further mechanical properties, please go to: **Technical Guide. 7.-Other Properties.**
- * Optional: Insulating Glass Unit. U value (W/sqm.K), please go to: **Technical Guide. 8.-Insulating Glass Unit.**
- * Junction box type and location should be approved by the customer.

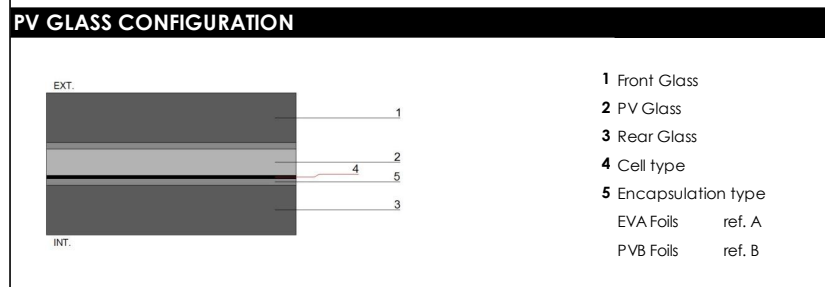
| PHOTOVOLTAIC GLASS | | 636BN-12452456-_-_- | | | |
|---------------------------------------|----------------|---------------------|----------------|----------------|-----------------|
| 1245 x 2456 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | | | | |
| | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mpp} (Wp) | 177 | 123 | 104 | 86 |
| Open-circuit voltage | V_{oc} (V) | 191 | 191 | 191 | 191 |
| Short-circuit current | I_{sc} (A) | 1,50 | 1,15 | 0,97 | 0,77 |
| Voltage at nominal power | V_{mpp} (V) | 132 | 132 | 132 | 132 |
| Current at nominal power | I_{mp} (A) | 1,34 | 0,93 | 0,79 | 0,65 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|----------------------------------|
| Length | mm 1245 |
| Width | mm 2456 |
| Thickness | mm 16,72 / 14,72 / 12,72 |
| Surface area | sqm 3,06 |
| Weight | Kg 116,3 / 101,0 / 85,7 |
| Cell type | α-Si Thin Film |
| Front Glass | 6 / 5 / 4 mm Tempered Glass |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 6 / 5 / 4 mm Tempered Glass |
| Thickness encapsulation | ref. A EVA Foils (not available) |
| | ref. B 1,52 mm PVB Foils |

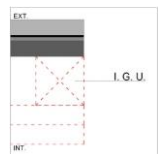
| Junction Box | |
|--------------------------------------|---|
| Protection | IP65 |
| Wiring Section | 2,5 mm ² / 4,0 mm ² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mpp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

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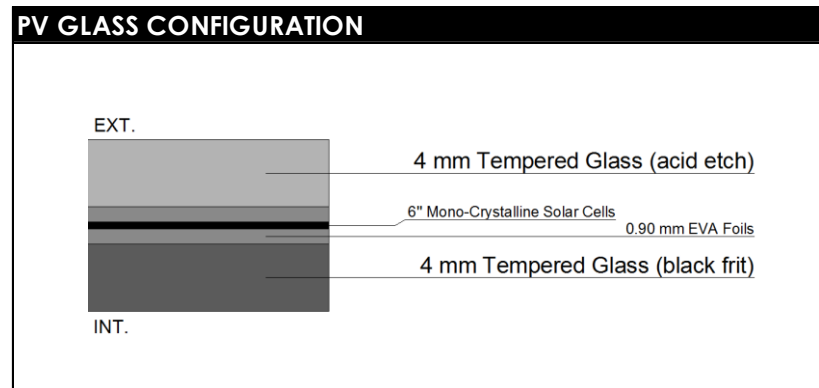
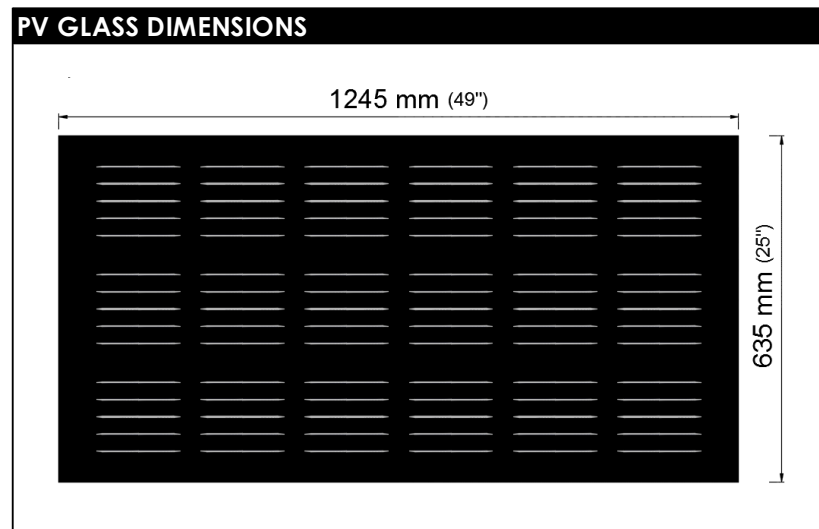
NOTES

- * For optical and further mechanical properties, please go to: **Technical Guide. 7.-Other Properties.**
- * Optional: Insulating Glass Unit. U value (W/sqm.K), please go to: **Technical Guide. 8.-Insulating Glass Unit.**
- * Junction box type and location should be approved by the customer.



| PHOTOVOLTAIC GLASS 1.245 x 635 | | |
|--|--|-----------------------------|
| 044A-12450635-00-M 6" Mono 158 Crystalline | | |
| Electrical data test conditions (STC) | | |
| Nominal peak power | 81 | P_{mpp} (Wp) |
| Open-circuit voltage | 12 | V_{oc} (V) |
| Short-circuit current | 8,66 | I_{sc} (A) |
| Voltage at nominal power | 10 | V_{mpp} (V) |
| Current at nominal power | 8,38 | I_{mpp} (A) |
| Power tolerance not to exceed | ± 10 | % |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | |
| Mechanical description | | |
| Length | 1245 | mm |
| Width | 635 | mm |
| Thickness | 9,8 | mm |
| Surface area | 0,79 | sqm |
| Weight | 16 | Kgs |
| Cell type | 6" Mono 158 | Crystalline |
| No PV cells / Transparency degree | 18 | 0% |
| Front Glass | 4 mm | Tempered Glass (acid etch) |
| Rear Glass | 4 mm | Tempered Glass (black frit) |
| Thickness encapsulation | 1,80 mm | EVA Foils |
| Category / Color code | | |
| Junction Box | | |
| Protection | IP65 | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | |
| Limits | | |
| Maximum system voltage | 1000 | V_{sys} (V) |
| Operating module temperature | -40...+85 | °C |
| Temperature Coefficients | | |
| Temperature Coefficient of Pmp | -0,32 | %/°C |
| Temperature Coefficient of Voc | -0,28 | %/°C |
| Temperature Coefficient of Isc | 0,07 | %/°C |

* All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|-------------------------|-------|
| Light Transmission | 0% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 103,0 |

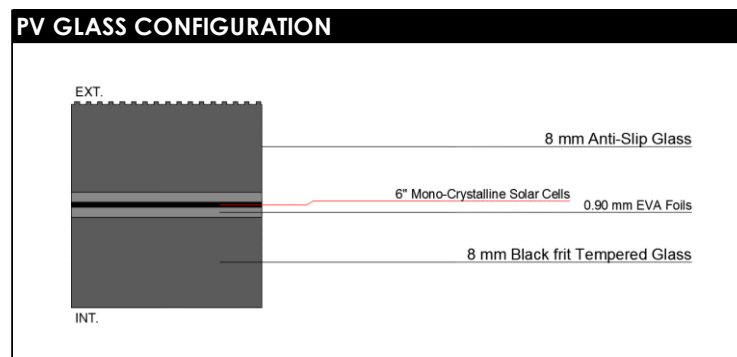
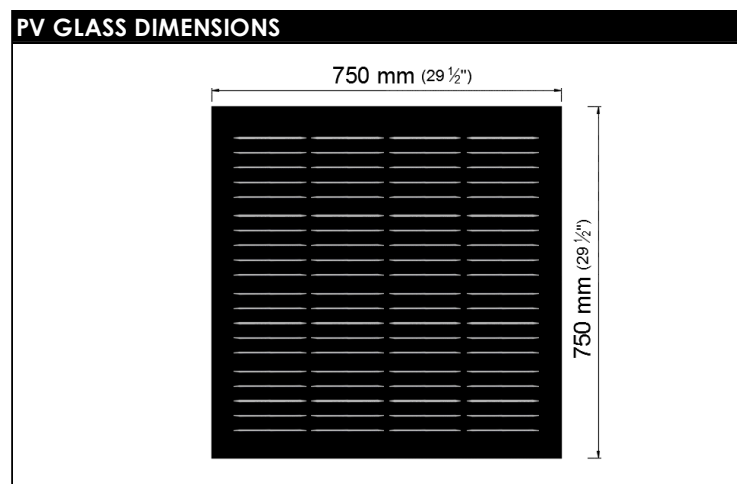


TECHNICAL DATA SHEETS: PV GLASS FLOOR

FICHAS TÉCNICAS: SUELO TRANSITABLE FOTOVOLTAICO

| PHOTOVOLTAIC GLASS | | 750 x 750 | |
|--|--|----------------------------|-------------|
| 088A0-07500750-00-M | | 6" Mono 158 | Crystalline |
| Electrical data test conditions (STC) | | | |
| Nominal peak power | 72 | P_{mpp} (Wp) | |
| Open-circuit voltage | 11 | V_{oc} (V) | |
| Short-circuit current | 8,66 | I_{sc} (A) | |
| Voltage at nominal power | 9 | V_{mpp} (V) | |
| Current at nominal power | 8,38 | I_{mpp} (A) | |
| Power tolerance not to exceed | ± 10 | % | |
| STC: 1000 w/m ² , AM 1.5 and a cell temperature of 25°C, stabilized module state. | | | |
| Mechanical description | | | |
| Length | 750 | mm | |
| Width | 750 | mm | |
| Thickness | 17,8 | mm | |
| Surface area | 0,56 | sqm | |
| Weight | 23 | Kgs | |
| Cell type | 6" Mono 158 | Crystalline | |
| No PV cells / Transparency degree | 16 | 0% | |
| Front Glass | 8 mm | Tempered Glass (anti-slip) | |
| Rear Glass | 8 mm | Black Frit Tempered Glass | |
| Thickness encapsulation | 1,80 mm | EVA Foils | |
| Category / Color code | | | |
| Junction Box | | | |
| Protection | IP65 | | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | | |
| Limits | | | |
| Maximum system voltage | 1000 | V_{sys} (V) | |
| Operating module temperature | -40...+85 | °C | |
| Temperature Coefficients | | | |
| Temperature Coefficient of P_{mpp} | -0,32 | %/°C | |
| Temperature Coefficient of V_{oc} | -0,28 | %/°C | |
| Temperature Coefficient of I_{sc} | 0,07 | %/°C | |

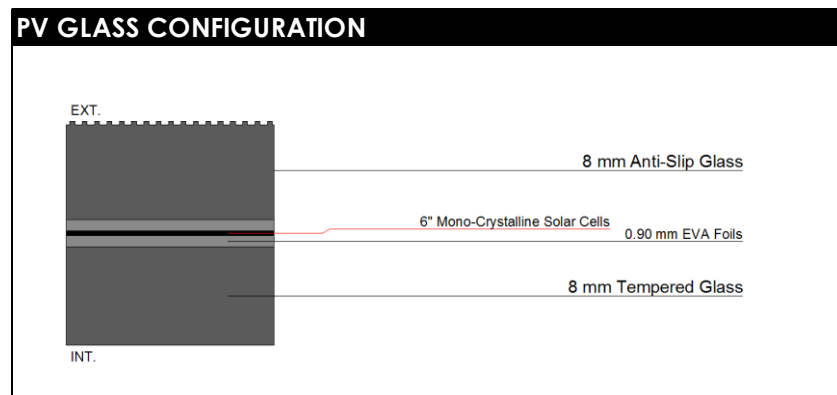
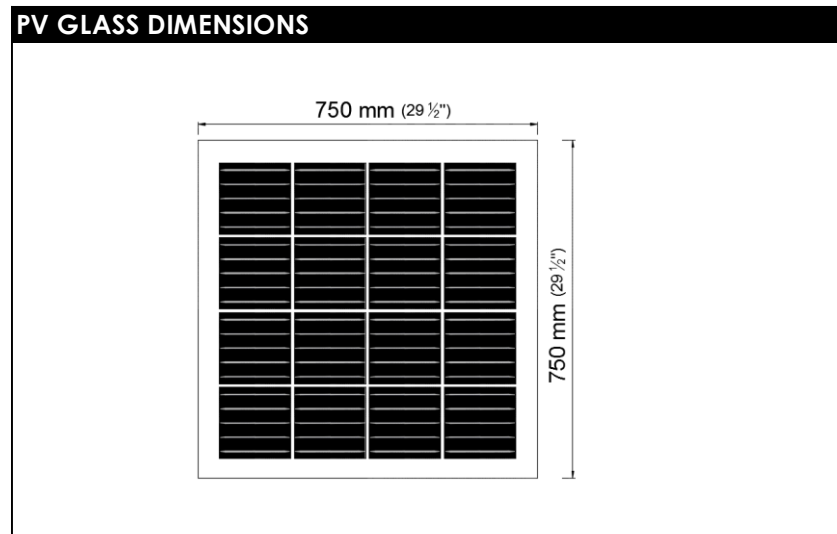
* All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|---------------------|-------|
| Light Transmission | 0% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 128,6 |

| PHOTOVOLTAIC GLASS 750 x 750 | | |
|---|--|----------------------------|
| 088A0-07500750-28-M 6" Mono 158 Crystalline | | |
| Electrical data test conditions (STC) | | |
| Nominal peak power | 72 | P _{mpp} (Wp) |
| Open-circuit voltage | 11 | V _{oc} (V) |
| Short-circuit current | 8,66 | I _{sc} (A) |
| Voltage at nominal power | 9 | V _{mpp} (V) |
| Current at nominal power | 8,38 | I _{mpp} (A) |
| Power tolerance not to exceed | ± 10 | % |
| STC: 1000 w/m ² , AM 15 and a cell temperature of 25°C, stabilized module state. | | |
| Mechanical description | | |
| Length | 750 | mm |
| Width | 750 | mm |
| Thickness | 17,8 | mm |
| Surface area | 0,56 | sqm |
| Weight | 23 | Kgs |
| Cell type | 6" Mono 158 | Crystalline |
| No PV cells / Transparency degree | 16 | 28% |
| Front Glass | 8 mm | Tempered Glass (anti-slip) |
| Rear Glass | 8 mm | Tempered Glass |
| Thickness encapsulation | 1,80 mm | EVA Foils |
| Category / Color code | | |
| Junction Box | | |
| Protection | IP65 | |
| Wiring Section | 2,5 mm ² or 4,0 mm ² | |
| Limits | | |
| Maximum system voltage | 1000 | V _{sys} (V) |
| Operating module temperature | -40...+85 °C | |
| Temperature Coefficients | | |
| Temperature Coefficient of P _{mpp} | -0,32 | %/°C |
| Temperature Coefficient of V _{oc} | -0,28 | %/°C |
| Temperature Coefficient of I _{sc} | 0,07 | %/°C |

* All technical specifications are subject to change without notice by Onyx Solar



| GLASS PROPERTIES | |
|-------------------------|--------------|
| Light Transmission | 28% |
| U-value (W/sqm.K) | 5.2 |
| Peak Power [Wp/sqm] | 128,6 |

| PHOTOVOLTAIC GLASS | | 636BN-06000600-_-_- | | | |
|---------------------------------------|---------------|---------------------|----------------|----------------|-----------------|
| 600 x 600 mm | | ref. 00 | ref. 10 | ref. 20 | ref. 30 |
| Electrical data test conditions (STC) | | DARK (0%) | M VISION (10%) | L VISION (20%) | XL VISION (30%) |
| Nominal peak power | P_{mp} (Wp) | 21 | 14 | 12 | 10 |
| Open-circuit voltage | V_{oc} (V) | 47 | 47 | 47 | 47 |
| Short-circuit current | I_{sc} (A) | 0,72 | 0,55 | 0,47 | 0,37 |
| Voltage at nominal power | V_{mp} (V) | 32 | 32 | 32 | 32 |
| Current at nominal power | I_{mp} (A) | 0,65 | 0,45 | 0,38 | 0,31 |
| Power tolerance not to exceed | % | ±5 | ±5 | ±5 | ±5 |

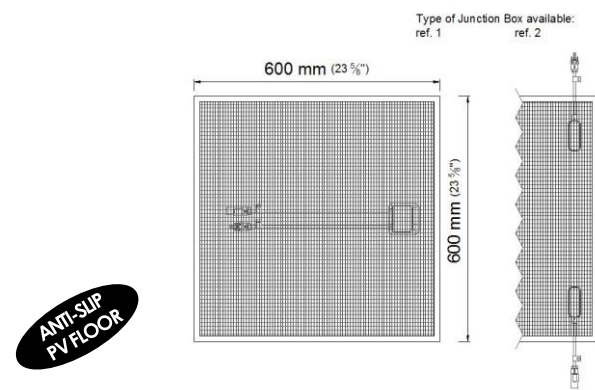
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

| Mechanical description | |
|-------------------------|----------------------------------|
| Length | mm 600 |
| Width | mm 600 |
| Thickness | mm 16,72 |
| Surface area | sqm 0,36 |
| Weight | Kg 14,40 |
| Cell type | α-Si Thin Film |
| Front Glass | 6 mm Anti-Slip Glass |
| PV Glass | 3,2 mm Float Glass |
| Rear Glass | 6 mm Tempered Glass |
| Thickness encapsulation | ref. A EVA Foils (not available) |
| | ref. B 1,52 mm PVB Foils |

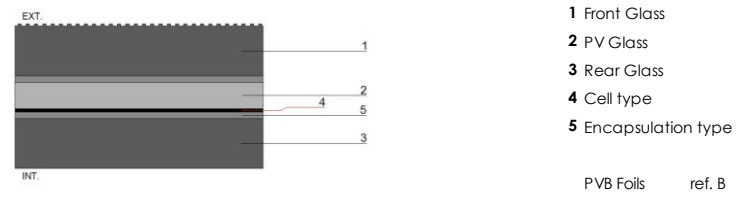
| Junction Box | |
|-------------------------------------|---------------------|
| Protection | IP65 |
| Wiring Section | 2,5 mm² / 4,0 mm² |
| Limits | |
| Maximum system voltage | V_{sys} (V) 1.000 |
| Operating module temperature | °C -40...+85 |
| Temperature Coefficients | |
| Temperature Coefficient of P_{mp} | %/°C -0,19 |
| Temperature Coefficient of V_{oc} | %/°C -0,28 |
| Temperature Coefficient of I_{sc} | %/°C +0,09 |

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



PV GLASS CONFIGURATION

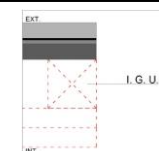


NOTES

* For optical and further mechanical properties, please go to:

Technical Guide. 7.-Other Properties.

* Junction box type and location should be approved by the customer.



OTHER PROPERTIES

OTRAS PROPIEDADES

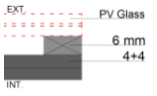

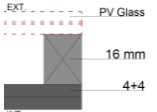


| PROPERTIES STANDARDS | GLASS 6T+3+6T | | | |
|--|-------------------------|-----------|-----------|-----------|
| | 0% | 10% | 20% | 30% |
| PEAK POWER (Wp/m ²) | 57.6 | 40.0 | 34.0 | 28.0 |
| SPECIFIC WEIGHT (Kg/m ²) | 41 | 41 | 41 | 41 |
| THERMAL TRANSMITTANCE (U value) UNE-EN 673:1998 | 5.2 | 5.2 | 5.2 | 5.2 |
| SOLAR FACTOR (g) UNE-EN 410:2011 | 23.00% | 29.00% | 32.00% | 37.00% |
| TRANSMISSION UV UNE-EN 410:1998 | 0.00% | 0.10% | 0.30% | 0.40% |
| SOLAR TRANSMISSION UNE-EN 410:1998 | 0.00% | 7.40% | 11.50% | 18.60% |
| LIGHT TRANSMISSION UNE-EN 410:1998 | 0.00% | 10.10% | 16.30% | 26.70% |
| LIGHT REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998 | 7.30% | 7.30% | 7.00% | 7.10% |
| LIGHT REFLECTION (INNER SIDE) UNE-EN 410:1998 | 52.00% | 49.30% | 44.40% | 34.30% |
| SOLAR REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998 | 11.50% | 10.20% | 8.50% | 9.00% |
| SOLAR REFLECTION (INNER SIDE) UNE-EN 410:1998 | 43.00% | 41.10% | 35.80% | 28.50% |
| FIRE REACTION Standard classification UNE-EN 13501-1:2007 UNE-EN 13823:2002 / ISO 11925-2:2002 | B-s1,d0 | B-s1,d0 | B-s1,d0 | B-s1,d0 |
| RESISTENCE TO SOFT BODY IMPACT UNE-EN 12600:2003 | 1(B)1 | 1(B)1 | 1(B)1 | 1(B)1 |
| TEMPERED GLASS STANDARDS UNE-EN 12150 | Comply with UNE-EN12150 | | | |
| ACOUSTIC ATTENUATION UNE-EN 12578:2002 | dB | 34(-1;-3) | 34(-1;-3) | 34(-1;-3) |
| RESISTENCE TO EFFRACTION UNE-EN 356:2001 | P3A | P3A | P3A | P3A |
| HIGH TEMPERATURE TEST UNE-EN ISO 12543-4:1998 | APPROVED | | | |
| RADIATION TEST UNE-EN ISO 12543-4:1998 | APPROVED | | | |
| ACCELERATED AGING TEST UNE-EN 4892-2:2006 | APPROVED | | | |

| PROPERTIES STANDARDS | GLASS 3+4 | | | |
|--|---------------|-----------|-----------|-----------|
| | 0% | 10% | 20% | 30% |
| PEAK POWER (Wp/m ²) | 57.6 | 40.0 | 34.0 | 28.0 |
| SPECIFIC WEIGHT (Kg/m ²) | 16.7 | 16.7 | 16.7 | 16.7 |
| THERMAL TRANSMITTANCE (U value) UNE-EN 673:1998 | 5.7 | 5.7 | 5.7 | 5.7 |
| SOLAR FACTOR (g) UNE-EN 410:2011 | 22.00% | 29.00% | 34.00% | 41.00% |
| TRANSMISSION UV UNE-EN 410:1998 | 0.00% | 1.50% | 1.50% | 4.70% |
| SOLAR TRANSMISSION UNE-EN 410:1998 | 0.20% | 9.40% | 15.00% | 24.30% |
| LIGHT TRANSMISSION UNE-EN 410:1998 | 0.20% | 10.80% | 17.30% | 28.40% |
| LIGHT REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998 | 7.60% | 8.30% | 7.60% | 8.20% |
| LIGHT REFLECTION (INNER SIDE) UNE-EN 410:1998 | 61.00% | 52.90% | 47.80% | 37.90% |
| SOLAR REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998 | 14.80% | 13.90% | 11.10% | 12.40% |
| SOLAR REFLECTION (INNER SIDE) UNE-EN 410:1998 | 60.00% | 52.20% | 46.70% | 37.90% |
| FIRE REACTION Standard classification UNE-EN 13501-1:2007 UNE-EN 13823:2002 / ISO 11925-2:2002 | B-s1,d0 | B-s1,d0 | B-s1,d0 | B-s1,d0 |
| RESISTENCE TO SOFT BODY IMPACT UNE-EN 12600:2003 | 2(B)2 | 2(B)2 | 2(B)2 | 2(B)2 |
| TEMPERED GLASS STANDARDS UNE-EN 12150 | Not Aplicable | | | |
| ACOUSTIC ATTENUATION UNE-EN 12578:2002 | dB | 32(-1;-3) | 32(-1;-3) | 32(-1;-3) |
| RESISTENCE TO EFFRACTION UNE-EN 356:2001 | Not Aplicable | | | |
| HIGH TEMPERATURE TEST UNE-EN ISO 12543-4:1998 | APPROVED | | | |
| RADIATION TEST UNE-EN ISO 12543-4:1998 | APPROVED | | | |
| ACCELERATED AGING TEST UNE-EN 4892-2:2006 | APPROVED | | | |

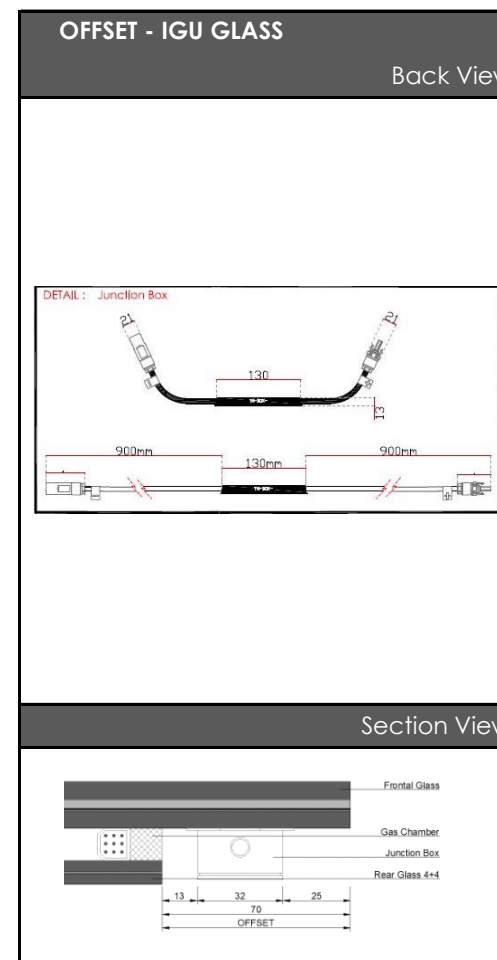


INSULATING GLASS UNITS

VIDRIO AISLANTE O DE DOBLE ACRISTALAMIENTO

| INERT GAS HOUSE | CONFIGURATION | U value | |
|--|-----------------------|-------------------|---------|
| | | | CHAMBER |
| SINGLE SPACER 6 mm  | 6 mm Air Chamber | 4+4 mm | 3,2 |
| | 6 mm Argon Chamber | 4+4 mm | 2,9 |
| | 6 mm Air Chamber | 4+4 mm low-e | 2,4 |
| | 6 mm Argon Chamber | 4+4 mm low-e | 1,9 |
| SINGLE SPACER 12 mm  | 12 mm Air Chamber | 4+4 mm | 2,7 |
| | 12 mm Argon Chamber | 4+4 mm | 2,6 |
| | 12 mm Air Chamber | 4+4 mm low-e | 1,6 |
| | 12 mm Argon Chamber | 4+4 mm low-e | 1,2 |
| SINGLE SPACER 16 mm  | 16 mm Air Chamber | 4+4 / 6T mm | 2,6 |
| | 16 mm Argon Chamber | 4+4 / 6T mm | 2,5 |
| | 16 mm Air Chamber | 4+4 / 6T mm low-e | 1,3 |
| | 16 mm Argon Chamber | 4+4 / 6T mm low-e | 1,1 |
| SINGLE SPACER 20 mm  | 20 mm Air Chamber | 4+4 mm | 2,7 |
| | 20 mm Argon Chamber | 4+4 mm | 2,5 |
| | 20 mm Air Chamber | 4+4 mm low-e | 1,4 |
| | 20 mm Argon Chamber | 4+4 mm low-e | 1,1 |
| DOUBLE SPACER 12 / 4 / 12 mm  | 12/4/12 Air Chamber | 4+4 mm | 1,9 |
| | 12/4/12 Argon Chamber | 4+4 mm | 1,7 |
| | 12/4/12 Air Chamber | 4+4 mm low-e | 1,2 |
| | 12/4/12 Argon Chamber | 4+4 mm low-e | 1,0 |

*U Value calculated including frontal glass configuration of 3+4.



*Junction box type and configuration could be adapted for clients request or project needs.

STANDARDS & CERTIFICATIONS

NORMATIVAS Y CERTIFICADO

 **DEPENDING ON THE FINAL BIPV GLASS CONFIGURATION, IT CAN COMPLY WITH THE FOLLOWING STANDARDS:**

Photovoltaic glass:

IEC 61646: Thin-film terrestrial photovoltaic (PV) modules Design qualification and type approval

IEC 61215: Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval

IEC 61730-1: Safety qualification for PV modules of crystalline silicon for construction use.

UL 1703: Flat-Plate Photovoltaic Modules and Panels

ISO 12543-4:2011. Glass in building - Laminated glass and laminated safety glass

EN 13501:2007. Fire classification of construction products and building elements

EN 356:2001. Resistance against hand stroke

EN 410:2011. Glass in building - Determination of luminous and solar characteristics of glazing.

EN 12150:2005. Glass in building - Thermally toughened soda lime silicate safety glass.

EN 12600:2003. Glass in building - Pendulum test - Impact test method and classification for flat glass

 **DEPENDIENDO DE LA CONFIGURACION FINAL, EL VIDRIO FV PUEDE CUMPLIR CON LAS SIGUIENTES NORMATIVAS:**

Vidrio Fotovoltaico:

IEC 61646: Módulos fotovoltaicos (FV) de lámina delgada para uso terrestre. Cualificación del diseño y homologación.

IEC 61215: Módulos fotovoltaicos (FV) de silicio cristalino para uso terrestre. Cualificación del diseño y homologación.

IEC 61730-1: Cualificación de la seguridad de los módulos fotovoltaicos (FV). Parte 1: Requisitos de construcción.

UL 1703: Módulos y Paneles Fotovoltaicos de Placa Plana.

ISO 12543-4:2011. Vidrio para la edificación. Vidrio laminado y vidrio laminado de seguridad.

EN 13501:2007. Clasificación en función del comportamiento frente al fuego de los productos de construcción y elementos para la edificación.

EN 356:2001. Vidrio de construcción. Vidrio de seguridad. Ensayo y clasificación de la resistencia al ataque manual.

EN 410:2011. Vidrio para la edificación. Determinación de las características luminosas y solares de los acristalamientos.

EN 12150:2005. Vidrio para la edificación. Vidrio de silicato sodocálcico de seguridad templado térmicamente.

EN 12600:2003. Vidrio para la edificación. Ensayo pendular. Método de ensayo al impacto y clasificación para vidrio plano.



Interlayers:

- ANSI Z97.1. Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test.
- ASTM D792. Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- ASTM E1269. Standard Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry.
- ASTM D1004. Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- ASTM D542. Standard Test Method for Index of Refraction of Transparent Organic Plastics.
- ASTM E1354. Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.
- ASTM F433. Standard Practice for Evaluating Thermal Conductivity of Gasket Materials.
- ASTM D1929. Standard Test Method for Determining Ignition Temperature of Plastics.
- EN 410:2011. Glass in building - Determination of luminous and solar characteristics of glazing.
- JIS K6771. Flexible vinyl tube.

Encapsulantes:

- ANSI Z97.1. Materiales de Vidrio de Seguridad usados en Edificación - Especificaciones de Desempeño de Seguridad y Métodos de Prueba.
- ASTM D792. Métodos de Prueba Estándar para la Densidad y Gravedad específica (Densidad Relativa) de plásticos por Desplazamiento.
- ASTM E1269. Método de Prueba Estándar para determinar la capacidad calorífica específica mediante Análisis Térmico Diferencial.
- ASTM D1004. Método de Prueba Estándar para la Resistencia al Desgarro de láminas de plástico.
- ASTM D542. Método de Prueba Estándar para medir el Índice de refracción de plásticos orgánicos transparentes.
- ASTM E1354. Método de prueba estándar para el calor y las tasas de emisiones visibles de humo Materiales y Productos usando un calorímetro de consumo de oxígeno.
- ASTM F433. Práctica estándar para la evaluación de la conductividad térmica de los materiales de las juntas.
- ASTM D1929. Método de prueba estándar para determinar la temperatura de ignición de los plásticos.
- EN 410:2011. Vidrio para la edificación. Determinación de las características luminosas y solares de los acristalamientos
- JIS K6771. Tubo flexible de vinilo.



One Rail Junction Box:

- UL approved.
- TÜV approved to IEC 61215 ed. 2 approved.

Anti-Slip:

- UNE ENV 12633:2003. Method of determination of unpolished and polished slip/skid resistance value.
- DIN 51130: Ramp Method Standard Footwear.
- DIN 51097: Ramp Method Barefoot.
- ASTM C 1028-07: Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like- Surfaces by the Horizontal Dynamometer Pull-Meter Method.

Caja de conexiones Monopolar:

- UL aprobada.
- TÜV aprobada para IEC 61215 ed. 2 aprobada.

Anti-Deslizante:


- UNE ENV 12633:2003. Método para la determinación del valor de la resistencia al deslizamiento/resbalamiento de los pavimentos pulidos y sin pulir.
- DIN 51130: Método de rampa, Pies calzados.
- DIN 51097: Método de rampa, Pies descalzos.
- ASTM C 1028-07: Método de prueba estándar para determinar el coeficiente de fricción estática de Baldosa Cerámicas y Otras superficies similares por el método de Dinamómetro Horizontal.

| FLOOR GLASS CERTIFICATION CERTIFICACIÓN DE SUELO | DESCRIPTION DESCRIPCIÓN | CLASIFICATION CLASIFICACIÓN |
|---|--|--------------------------------|
| UNE ENV 12633 | Pendulum method / <i>Prueba pendular</i> | Class 3 |
| DIN 51130 | Ramp method Shod foot / <i>Pie calzado en rampa</i> | R-12 |
| DIN 51097 | Ramp method Bare foot / <i>Pie descalzo en rampa</i> | Class B |
| ASTM C 1028-07 | Coefficient Dry / <i>coeficiente seco</i> | ≥ 0,7 |
| | Coefficient Wet / <i>coeficiente húmedo</i> | ≥ 0,6 |
| EN 101:91 MOHS | Surface hardness / <i>dureza superficial</i> | Scale 4 |
| UL 410 | Slip coefficient / <i>coeficiente de deslizamiento</i> | > 0,6 |




STANDARDS AND CERTIFICATIONS FOR PV FLOOR GLASS

ADA requirements of Slip coefficient *Slip resistance is based on the frictional force needed on the walking surface to keep the shoes and crutches from slipping while walking under otherwise slippery conditions. While the dynamic coefficient of friction during walking varies in a complex and non-uniform way, the static coefficient of friction, which can be measured in several ways, provides a close approximation of the slip resistance of a surface. The Occupational Safety and Health Administration recommend that walking surfaces have a static coefficient of friction of 0.5. A research project sponsored by the Architectural and Transportation Barriers Compliance Board (Access Board) conducted tests with persons with disabilities and concluded that a higher coefficient of friction was needed. A static coefficient of friction of 0.6 is recommended for accessible routes and 0.8 for ramps.

 Any type of manipulation or installation that is not contained in the norms stipulated in this document, along with any other concerns, the installer must be consulted with the supplier company to receive proper instructions.

NORMATIVAS Y CERTIFICACIONES PARA EL SUELO FV

Requisitos de la ADA de Coeficiente de deslizamiento *La resistencia al deslizamiento se basa en la fuerza de fricción necesaria para evitar que el tacón de un zapato o la punta de una muleta se deslicen sobre una superficie transitable bajo condiciones probables de encontrar en esa superficie. Mientras que el coeficiente de fricción dinámico durante la marcha varía de una forma compleja y no uniforme, el coeficiente estático de fricción, que se puede medir de varias maneras, proporciona una estrecha aproximación de la resistencia al deslizamiento de una superficie. La Administración de Seguridad y Salud recomiendan que las superficies transitables tengan un coeficiente de fricción estática de 0,5. Un proyecto de investigación patrocinado por la Junta de Cumplimiento de Barreras Arquitectónicas y de Transporte (Access Board) llevó a cabo pruebas con personas con discapacidad y concluyó que un mayor coeficiente de fricción era necesario para tales personas. Se recomienda un coeficiente estático de fricción de 0,6 para rutas accesibles y 0,8 para las rampas.

 Cualquier tipo de manipulación o instalación que no esté contenida en las normas estipuladas en este documento y que pueda significar alguna duda para el instalador, debe ser consultado con la empresa proveedora para recibir la información correspondiente.



CERTIFICATE

AENOR has issued an IQNet recognized certificate that the organization:

ONYX SOLAR ENERGY, S.L.

CALLE RÍO CEA, 1-46.
05004 - ÁVILA

CALLE PALMA DE MALLORCA, PCLA. 8 POLÍGONO INDUSTRIAL
VICOLOZANO.
05194 - VICOLOZANO
(ÁVILA)

has implemented and maintains a

Quality Management System

for the following scope:

**Design and production of photovoltaic glass in thin film and crystalline technologies.
Design and development of projects including photovoltaic glass solutions for architectural integration.**

which fulfills the requirements of the following standard

ISO 9001:2015

First issued on: **2016-12-01** Last issued: **2022-12-01** Validity date: **2025-12-01**

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: **ES-0630/2016**



Alex Stoichitoiu
Alex Stoichitoiu
President of IQNet

Rafael GARCÍA MEIRO
Rafael GARCÍA MEIRO
Chief Executive Officer

AENOR
Confía

IQNet Partners*:
AENOR Spain AFNOR Certification France APCER Portugal CCC Cyprus CISQ Italy
CQC China CQM China CQS Czech Republic Cro Cert Croatia DQS Holding GmbH Germany EAGLE Certification Group USA
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NYCE-SIGE Mexico PCBC Poland Quality Austria Austria RR Russia SH Israel SIQ Slovenia
SIRM QAS International Malaysia SQS Switzerland SRAC Romania TEST St Petersburg Russia TSE Turkey YUQS Serbia

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

Original Electrónico

AENOR
Confía



Certificado del Sistema de Gestión de la Calidad

AENOR

GESTIÓN
DE LA CALIDAD
ISO 9001

ER-0630/2016

AENOR certifica que la organización

ONYX SOLAR ENERGY, S.L.

dispone de un sistema de gestión de la calidad conforme con la Norma ISO 9001:2015

para las actividades: El diseño y la producción de vidrio fotovoltaico de tecnología thin film y cristalina.
El diseño y desarrollo de proyectos con soluciones de vidrio fotovoltaico para la integración arquitectónica.

que se realizan en: CALLE RÍO CEA, 1-46. 05004 - ÁVILA
CALLE PALMA DE MALLORCA, PCLA. 8 POLÍGONO INDUSTRIAL
VICOLOZANO. 05194 - VICOLOZANO (ÁVILA)

Fecha de primera emisión: 2016-12-01
Fecha de última emisión: 2022-12-01
Fecha de expiración: 2025-12-01



AENOR INTERNACIONAL S.A.U.
Génova, 6. 28004 Madrid, España
Tel. 91 492 60 00. - www.aenor.com



Rafael GARCÍA MEIRO
Rafael GARCÍA MEIRO
Director General





THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

AENOR has issued an IQNet recognized certificate that the organization:

ONYX SOLAR ENERGY, S.L.

CALLE RÍO CEA, 1-46.
05004 - ÁVILA

CALLE PALMA DE MALLORCA, PCLA. 8 POLÍGONO INDUSTRIAL
VICOLOZANO.
05194 - VICOLOZANO (ÁVILA)

has implemented and maintains a
Environmental Management System

for the following scope:

**Design and production of photovoltaic glass in thin film and crystalline technologies.
Design and development of projects including photovoltaic glass solutions for architectural integration.**

which fulfills the requirements of the following standard

ISO 14001:2015

First issued on: **2016-12-01** Last issued: **2022-12-01** Validity date: **2025-12-01**

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: **ES-2016/0256**



Alex Stoichitoiu
Alex Stoichitoiu
President of IQNet

Rafael GARCÍA MEIRO
Rafael GARCÍA MEIRO
Chief Executive Officer



IQNet Partners:

AENOR Spain AFNOR Certification France APCER Portugal CCC Cyprus CISQ Italy
CQC China CQM China CQS Czech Republic Cro Cert Croatia DQS Holding GmbH Germany EAGLE Certification Group USA
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Certificado del Sistema de Gestión Ambiental



GA-2016/0256

AENOR certifica que la organización

ONYX SOLAR ENERGY, S.L.

dispone de un sistema de gestión ambiental conforme con la Norma ISO 14001:2015

para las actividades: El diseño y la producción de vidrio fotovoltaico de tecnología thin film y cristalina.
El diseño y desarrollo de proyectos con soluciones de vidrio fotovoltaico para la integración arquitectónica.

que se realiza/n en: CALLE RÍO CEA, 1-46. 05004 - ÁVILA
CALLE PALMA DE MALLORCA, PCLA. 8 POLÍGONO INDUSTRIAL
VICOLOZANO. 05194 - VICOLOZANO (ÁVILA)

Fecha de primera emisión: 2016-12-01
Fecha de última emisión: 2022-12-01
Fecha de expiración: 2025-12-01



AENOR INTERNACIONAL S.A.U.
Génova, 6. 28004 Madrid, España
Tel. 91 432 60 00. www.aenor.com



Rafael GARCÍA MEIRO
Rafael GARCÍA MEIRO
Director General





ZERTIFIKAT CERTIFICATE

Hiermit wird bescheinigt, dass die Firma / This certifies that the company

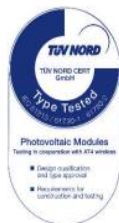
ONYX Solar Energy, S.L.
Rio Cea 1-46
05004 Ávila, Spain

berechtigt ist, das unten genannte Produkt mit dem abgebildeten Zeichen zu kennzeichnen
is authorized to provide the product mentioned below with the mark as illustrated

Fertigungsstätte / Manufacturing plant: **ONYX Solar Energy, S.L.**
Calle Palma de Mallorca, parcela 8. Poligono Vicolozano
05194 Ávila, Spain

Beschreibung des Produktes / Description of product: **Photovoltaic modules**
Family Glass/Glass and Glass/backsheet

Geprüft nach / Tested in accordance with: **IEC 61215:2005**
IEC 61730-1:2004+A1:2011+A2:2013
IEC 61730-2:2004+A1:2011



Registrier-Nr. / Registered No. 44 780 170008001
Prüfbericht Nr. / Test Report No. 3519 3544
Aktenzeichen / File reference 2.4 - 4001/17

Gültigkeit / Validity
von / from 2017-02-13
bis / until 2022-02-12

TÜV NORD CERT GmbH
Zertifizierungsstelle Konsumgüter

Essen, 2017-02-13

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de prodcert@tuev-nord.de

Bitte beachten Sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf



CERTIFICATE

on the inspection of a product manufacturing facility
applied for TÜV NORD CERT approval marks

ONYX Solar Energy, S.L.
Rio Cea 1-46
05004 Ávila
Spain

Manufacturing facility: **ONYX Solar Energy, S.L.**
Calle Palma de Mallorca, parcela 8. Poligono Vicolozano
05194 Ávila
Spain

Products: **PV modules**

Date of inspection: **19.05.2021**

Inspection summary:
The applicant was able to demonstrate that the manufacturing facility is technically equipped and managed in such a way
that uniform production is guaranteed for the listed product(s).

Certificate Registration No. 44 786 170008-001
Certificate Registration No. 3529 8625
File-No. 2.4-4002/17

Validity
from 2020-12-22
until 2021-12-21

TÜV NORD CERT GmbH
Certification Body Consumer Products

Essen, 2021-06-16

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de prodcert@tuev-nord.de



CERTIFICATE OF COMPLIANCE

Certificate Number 20170127-E471549
Report Reference E471549-20170120
Issue Date 2017-JANUARY-27

Issued to: ONYX SOLAR ENERGY S.L
Calle Rio Cea 1 - 46
05004 Avila SPAIN

This is to certify that representative samples of BUILDING-INTEGRATED PHOTOVOLTAIC MODULES AND PANELS
"See Addendum Page"

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1703 and ULC/ORD-C1703 - Flat-Plate Photovoltaic Modules and Panels

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

B. Smith

Boris Mikhomede, Director North American Certification Program

UL LLC

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www.tecnalia.com

Notice of Testing and Classification

| | |
|-----------------------|--|
| CUSTOMER | ONYX SOLAR ENERGY, S.L. |
| ADDRESS | C/ RIO CEA 1-46 05004 ÁVILA (SPAIN) |
| ASSOCIATED REPORT No. | 055158-001-1 055158-002-1 055158-003-1 055158-004-1 |

SAMPLE TESTED

Laminated glass made of two sheets of toughened glass of 6 mm and two layers of EVA of 0.90 mm with crystalline silicon cells referenced as follows:

«66-AN-»

CONDUCTED TEST

The tests requested are that of

- Impact resistance in accordance with UNE-EN 12600:2003
- Manual attack in accordance with UNE-EN 356:2001
- High temperature in accordance with UNE-EN ISO 12543-4:2011
- Humidity in accordance with UNE-EN ISO 12543-4:2011

RESULT

| | |
|-------------------|---------------------|
| Impact resistance | Class 1B1 |
| Manual attack | Class P2A |
| High temperature | SATISFACTORY |
| Humidity | SATISFACTORY |

Test dates 21.03.2016 – 19.04.2016

Date issued 20.04.2016

These results are the summary of the data included in the Test Report identified above as the associated test Report No.

The results obtained in these tests only refer to the sample(s) analysed at this centre on the date shown, and do not involve a sample referring to production quality.

tecnalia Inspiring Business
Signed: Susana Santamaria
Technical Consultant
Construction - Services





Notice of Testing and Classification

| | |
|------------------------------|--|
| CUSTOMER | ONYX SOLAR ENERGY, S.L. |
| ADDRESS | C/ RIO CEA 1-46 05004 ÁVILA (SPAIN) |
| ASSOCIATED REPORT No. | 055158-001-2 055158-002-2 055158-003-2 055158-004-2 |

SAMPLE TESTED

Laminated glass made of two sheets of toughened glass of 6 mm, two layers of PVB of 0.76 mm and photovoltaic silicon float glass of 3.2 mm referenced as follows:

«636-BN»

CONDUCTED TEST

The tests requested are that of

- **Impact resistance** in accordance with UNE-EN 12600:2003
- **Manual attack** in accordance with UNE-EN 356:2001
- **High temperature** in accordance with UNE-EN ISO 12543-4:2011
- **Humidity** in accordance with UNE-EN ISO 12543-4:2011

RESULT

| | |
|-------------------|---------------------|
| Impact resistance | Class 1B1 |
| Manual attack | Class P4A |
| High temperature | SATISFACTORY |
| Humidity | SATISFACTORY |

| | |
|--------------------|-------------------------|
| Test dates | 21.03.2016 – 19.04.2016 |
| Date issued | 20.04.2016 |

These results are the summary of the data included in the Test Report identified above as the associated test Report No.

The results obtained in these tests only refer to the sample(s) analysed at this centre on the date shown, and do not involve a sample referring to production quality.

Signed: Susana Santamaría
Technical Consultant
Construction - Services

Área Anardi, 5 - E-20730 Aspeltia (Gipuzkoa) - T - 902 760 020 T +34 946 430 850 (International calls)

REPORT No. 056269-004-4

| | |
|------------------------|---|
| CUSTOMER | ONYX SOLAR ENERGY, S.L. |
| APPLICANT | TEODOSIO DEL CAÑO |
| ADDRESS | C/ RIO CEA 1-46 05004 ÁVILA (SPAIN) |
| PURPOSE | SUPERVISION OF TEST OF PEEL STRENGTH |
| MATERIAL TESTED | LAMINATED GLASS REF. «Ionoplast interlayer» REF. «Ethylene-vinyl acetate interlayer EVA» REF. «Polyvinyl butyral interlayer PVB» |
| TEST DATE | 10.05.2016 |
| DATE ISSUED | 25.05.2016 |

Declaración de conformidad con el Reglamento de Evaluación de Conformación de Productos de Construcción de la Unión Europea (CEI) 04/08/16

Susana Santamaría
Technical Consultant
Construction - Services

* The results of this report solely and exclusively concern the material tested at the time and under the conditions in which the measurements were taken.
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| | | |
|---|--|---|
| TECNALIA RESEARCH & INNOVATION Área Anardi, 5 E-20730 Aspeltia (Gipuzkoa) | T 902 760 020 T +34 946 430 850 (International calls) | Sede Social / Headquarters Parque Científico y Tecnológico de Bizkaia C/Galdos, Edificio 700 E-48160 Derio - Bizkaia (Spain) |
|---|--|---|

REPORT No.: 056269-004-4

PAGE 1 / 17





AUTHORIZATION TO MARK

Report No. 103245381CRT-001
 ONYX SOLAR ENERGY S.L.

Page 31 of 49

Issued: 20-Dec-2017
 Revised: 8-Oct-2020

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listed model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.


Applicant: ONYX SOLAR ENERGY S.L.
Address: C/Rio Cea, 1-46 E05004, Avila

Manufacturer: ONYX SOLAR ENERGY S.L.
Address: C/Palma de Mallorca, Parcela nº8 Poligono Vicolozano E05194, Avila

Country: Spain
Contact: Mr. Vicente Velasco
Phone: (+34) 920 210 050
FAX: n/a
Email: vvelasco@onxysolar.com

Country: Spain
Contact: Mr. Vicente Velasco
Phone: (+34) 920 210 050
FAX: n/a
Email: vvelasco@onxysolar.com

Party Authorized To Apply Mark: Same as Manufacturer
Report Issuing Office: Lake Forest, CA

Control Number: 5009040 **Authorized by:** 
 for L. Matthew Snyder, Certification Manager



This document supersedes all previous Authorizations to Mark for the noted Report Number.

This Authorization to Mark is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Authorization to Mark. Only the Client is authorized to permit copying or distribution of this Authorization to Mark and then only to its entity. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement and in this Authorization to Mark. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of ensuring appropriate usage of the Certification mark in accordance with the agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Intertek Testing Services NA Inc.
 545 East Algonquin Road, Arlington Heights, IL 60005
 Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

| | |
|---------------------|--|
| Standard(s): | Standard for Flat-Plate Photovoltaic Modules and Panels [UL 1703:2002 Ed.3+R:26Sep2018] Flat Plate Photovoltaic Modules and Panels [ULC ORD C1703:2011 Ed.1] |
| Product: | Photovoltaic modules |
| Brand Name: | Onyx |
| Models: | ONYX G/B M140, ONYX G/B M170, ONYX G/B M230, ONYX G/B M240, ONYX G/B M250, ONYX G/B M260, ONYX G/B M270, ONYX G/B P230, ONYX G/B P240, ONYX G/B P250, ONYX G/B P260, ONYX G/G M01244, ONYX G/G M01688, ONYX G/G M03444, ONYX G/G M03666, ONYX G/G M03688, ONYX G/G M03611, ONYX G/G M04844, ONYX G/G M06044, ONYX G/G M06666, ONYX G/G M07255, ONYX G/G M08855, ONYX G/G M10055, ONYX G/G M10855, ONYX G/G M11255, ONYX G/G M12055, ONYX G/G M14055, ONYX G/G M14455, ONYX G/G M16855, ONYX G/G M02866, ONYX G/G M03266, ONYX G/G M02066, ONYX G/G M01266, ONYX G/G M01666, ONYX G/G M02466. |

| 7.0 Illustrations | | | | | | |
|--|---------|--------|--------|--------|---------|--------|
| Illustration 13 - Module ratings for all models in this report | | | | | | |
| Model | Pmp (W) | Voc(V) | Isc(A) | Vmp(V) | Imp (A) | MSV |
| 12 Mono Cells Models Glass on Glass (660 x 540mm) | | | | | | |
| Onyx G/G M01244 | 55 | 8 | 9.09 | 6 | 8.55 | 600 V |
| 12 Mono Cells Models Glass on Glass (838 x 711mm) | | | | | | |
| Onyx G/G M01266 | 53 | 8 | 8.93 | 6 | 8.39 | 600 V |
| 16 Mono Cells Models Glass on Glass (698 x 698mm) | | | | | | |
| Onyx G/G M01688 | 60 | 10.6 | 7.7 | 8.25 | 7.2 | 600 V |
| 16 Mono Cells Models Glass on Glass (914 x 838mm) | | | | | | |
| Onyx G/G M01666 | 71 | 10 | 8.93 | 8 | 8.39 | 600 V |
| 20 Mono Cells Models Glass on Glass (1041 x 838mm) | | | | | | |
| Onyx G/G M02066 | 88 | 13 | 8.93 | 11 | 8.39 | 600 V |
| 24 Mono Cells Models Glass on Glass (1092 x 838mm) | | | | | | |
| Onyx G/G M02466 | 106 | 15 | 8.93 | 13 | 8.39 | 600 V |
| 28 Mono Cells Models Glass on Glass (1422 x 838mm) | | | | | | |
| Onyx G/G M02866 | 124 | 18 | 8.93 | 15 | 8.39 | 600 V |
| 32 Mono Cells Models Glass on Glass (1676 x 838mm) | | | | | | |
| Onyx G/G M03266 | 141 | 20 | 8.93 | 17 | 8.39 | 600 V |
| 34 Mono Cells Models Glass on Glass (1386 x 1200mm) (Hexagonal) | | | | | | |
| Onyx G/G M03444 | 144 | 21.21 | 8.95 | 17.68 | 8.20 | 600 V |
| 36 Mono Cells Models Glass on Glass (1545 x 800mm) | | | | | | |
| Onyx G/G M03611 | 140 | 23.12 | 8.69 | 17.38 | 8.14 | 600 V |
| Onyx G/G M03688 | 140 | 23.43 | 8.84 | 17.64 | 8.15 | 600 V |
| Onyx G/G M03666 | 140 | 23.62 | 8.96 | 17.98 | 8.16 | 600 V |
| 36 Mono Cells Models with Frame & BackSheet (1706 x 1006mm) | | | | | | |
| Onyx G/B M140 | 140 | 23.62 | 8.96 | 17.98 | 8.16 | 600 V |
| 40 Mono Cells Models with Frame & BackSheet (1706 x 1006mm) | | | | | | |
| Onyx G/B M170 | 170 | 28.51 | 8.96 | 21.3 | 8.16 | 600 V |
| 48 Mono Cells Models Glass on Glass (1460 x 1700mm) | | | | | | |
| Onyx G/G M04844 | 200 | 31.89 | 8.96 | 24.98 | 8.16 | 600 V |
| 60 Poly Cells Models with Frame & BackSheet (1706 x 1006mm) | | | | | | |
| Onyx G/B P230 | 230 | 37.14 | 8.47 | 29.34 | 7.79 | 600 V |
| Onyx G/B P240 | 240 | 37.32 | 8.53 | 29.48 | 7.85 | 600 V |
| Onyx G/B P250 | 250 | 37.45 | 8.50 | 29.59 | 7.82 | 600 V |
| Onyx G/B P260 | 260 | 37.62 | 8.61 | 29.72 | 8.01 | 600 V |
| 60 Mono Cells Models with Frame & BackSheet (1706 x 1006mm) | | | | | | |
| Onyx G/B M230 | 230 | 38.62 | 8.65 | 28.93 | 7.85 | 600 V |
| Onyx G/B M240 | 240 | 38.90 | 8.84 | 30.42 | 8.03 | 600 V |
| Onyx G/B M250 | 250 | 39.18 | 8.96 | 30.64 | 8.14 | 600 V |
| Onyx G/B M260 | 260 | 39.30 | 9.18 | 30.73 | 8.34 | 600 V |
| Onyx G/B M270 | 270 | 39.59 | 9.37 | 30.96 | 8.58 | 600 V |
| 60 Mono Cells glass on glass models without a frame (1460x1700mm) | | | | | | |
| Onyx G/G M06044 | 250 | 39.18 | 8.96 | 30.64 | 8.16 | 600 V |
| 66 Mono Cells glass on glass models without a frame (1977x1009mm) | | | | | | |
| Onyx G/G M06666 | 291 | 42 | 8.93 | 35.00 | 8.39 | 1000 V |
| 72 Mono Cells Models Glass on Glass (2000 x1600 mm) | | | | | | |
| Onyx G/G M07255 | 300 | 47.10 | 8.99 | 37.68 | 8.16 | 600 V |
| 88 Mono Cells Models Glass on Glass (2000 x1600 mm) | | | | | | |
| Onyx G/G M08855 | 360 | 55.6 | 8.99 | 45.02 | 8.16 | 600 V |
| 100 Mono Cells Models Glass on Glass (2000 x 2000 mm) | | | | | | |
| Onyx G/G M10055 | 400 | 62.02 | 8.99 | 50.68 | 8.16 | 600 V |




| 7.0 Illustrations | | | | | | |
|--|---------|--------|--------|--------|---------|-------|
| Model | Pmp (W) | Voc(V) | Isc(A) | Vmp(V) | Imp (A) | MSV |
| 108 Mono Cells glass on glass models without a frame (2000x1600mm) | | | | | | |
| Onyx G/G M10855 | 450 | 70.96 | 9.00 | 56.76 | 8.18 | 600 V |
| 112 Mono Cells glass on glass models without a frame (2000x1600mm) | | | | | | |
| Onyx G/G M11255 | 470 | 71.00 | 9.00 | 58.38 | 8.18 | 600 V |
| 120 Mono Cells Models Glass on Glass (2000 x 2000 mm) | | | | | | |
| Onyx G/G M12055 | 500 | 78.84 | 9 | 63.07 | 8.18 | 600 V |
| 140 Mono Cells glass on glass models without a frame (2000x2000mm) | | | | | | |
| Onyx G/G M14055 | 550 | 84.00 | 8.61 | 63.00 | 7.75 | 600 V |
| 144 Mono Cells glass on glass models without a frame (2000x2000mm) | | | | | | |
| Onyx G/G M14455 | 600 | 86.40 | 8.61 | 69.12 | 7.75 | 600 V |
| 168 Mono Cells glass on glass models without a frame (2000x2000mm) | | | | | | |
| Onyx G/G M16855 | 650 | 100.80 | 8.61 | 80.64 | 7.75 | 600 V |

ED 16.3.15 (15-Oct-20) Mandatory



WARRANTY

CERTIFICADO DE GARANTÍA DEL PRODUCTO

 Onyx Solar Energy S.L., a company dedicated to the development of BIPV solutions for buildings and other sustainable building solutions, guarantees the quality of the glass/glass modules according to the technical specifications and applicable regulations described in this submittal.


Terms and conditions of the glass/glass PV Module warranty are expressed as follows:

1. WARRANTY DESCRIPTION

A) LIMITED WARRANTY FOR MATERIALS AND MANUFACTURING DEFECTS.

Onyx Solar Energy S.L guarantees during a period of **5 years**, starting from the initial purchase date, that the PV Module is free from any defect in material or manufacture.

If, during the WARRANTY term, your PV Module became inoperative as a consequence of any defect in the manufacturing or the materials, Onyx Solar Energy S.L (after verifying the communicated defect) reserves the right to choose between repairing the defective module, substituting an equivalent one or refunding the price of the defective module.

 Onyx Solar Energy S.L., empresa dedicada al desarrollo de soluciones de Integración Fotovoltaica para Edificios (BIPV, por sus siglas en inglés) y otras soluciones sostenibles para la construcción, garantiza la calidad de sus vidrios fotovoltaicos de acuerdo a las especificaciones técnicas y a las legislaciones pertinentes descritas en este manual. Los términos y condiciones de la garantía de los vidrios/módulos de vidrio fotovoltaicos se expresan a continuación:

1. DESCRIPCIÓN DE LA GARANTÍA

A) GARANTÍA PARA MATERIALES POR DEFECTOS DE MATERIALES Y FABRICACIÓN.

Onyx Solar Energy S.L garantiza que durante un periodo de **5 años** desde la fecha de compra, el modulo fotovoltaico estará libre de defectos en sus materiales o fabricación.

Si, durante el periodo de validez de esta garantía, el modulo fotovoltaico adquirido resulta inoperativo como consecuencia de cualquier defecto en la fabricación o en los materiales, Onyx Solar Energy S.L (tras verificar el defecto comunicado) se reserva el derecho a elegir entre reparar el modulo defectuoso, sustituirlo por uno equivalente o devolver el precio del módulo defectuoso



B) LIMITED WARRANTY FOR SPECIFIC OUTPUT POWER.

Table below shows the output power value production that Onyx Solar Energy S.L guarantees as a minimum value measured under standard conditions (STC)¹

| TIME ² | OUTPUT POWER VALUE ³ |
|-------------------|---------------------------------|
| 10 years | 80% |

(1) Standard conditions (STC): 1000W/m² solar radiation, cell temperature 25°C+/- 2°C and 1.5AM.

(2) Period starting from initial delivery date.

(3) Percentage applied on minimum power specified in this submittal

If Onyx Solar Energy S.L determines, using measuring standard conditions STC, that the PV Module is not generating the minimum specified output power guaranteed during the term of the warranty, then Onyx Solar Energy S.L reserves the right to choose between repairing the defective module, substituting it for an equivalent one or supplying the additional components to achieve, at least, the guaranteed minimum output power percentage.

B) GARANTÍA LIMITADA DE GENERACION DE ELECTRICIDAD.

La siguiente tabla muestra el valor de potencia de salida que Onyx Solar Energy S.L garantiza como valor mínimo medido bajo condiciones estándar (STC)¹

| DURACIÓN ² | VALOR DE LA POTENCIA DE SALIDA ³ |
|-----------------------|---|
| 10 años | 80% |

(1) Condiciones estándar (STC): 1000W/m² radiación solar, temperatura de la célula 25°C+/- 2°C and 1.5AM.

(2) Periodo que comienza desde la fecha de entrega de la mercancía.

(3) Porcentaje aplicado a la potencia mínima especificada en este manual.

Si Onyx Solar Energy S.L determina, usando las condiciones estándar de medida STC, que el módulo fotovoltaico no está generando la potencia de salida mínima especificada garantizada durante la duración de la garantía, entonces Onyx Solar Energy SL se reserva el derecho a elegir entre reparar el módulo defectuoso, sustituirlo por uno equivalente, o suministrar los componentes adicionales necesarios para obtener al menos el porcentaje mínimo de electricidad garantizado.



2. GENERAL TERMS.

The following conditions will be applicable to the PV glass/glass modules provided by Onyx Solar Energy S.L for this project and guaranteed according to the section above.

- Onyx Solar Energy S.L can, according to its own criteria, use new pieces or new products or refurbished products to repair the module or substitute the module under this WARRANTY with a new or refurbished one.
- Onyx Solar Energy S.L reserves the right to supply a different but equivalent module to attend the accepted claims in the case that the manufacturing of the original module may have ceased or that the initial specifications have been modified.
- Onyx Solar Energy S.L is not responsible for, and the client hereby accepts responsibility for the costs of any local work and any cost associated to the installation, elimination, reinstallation or transportation of the module and/or any other associate component serviced during the WARRANTY period.

The warranty offered herein will be applicable only while the (i) product is property of the initial purchaser that acquired the product for his own use and not in order to resell or (ii) acquired as a result of the purchase of the building where the product is installed.

The validity of the present warranty will not be extended beyond the original period specified and described in sections A) and B) of the present certificate.

2. TÉRMINOS GENERALES.

Las siguientes condiciones serán aplicables a los vidrios/módulos de vidrio fotovoltaicos suministrados por Onyx Solar Energy S.L para este proyecto y garantizados de acuerdo a la sección anterior.

- Onyx Solar Energy S.L puede, a su elección, utilizar partes o productos nuevos o restaurados para reparar el panel o la sustitución del panel bajo GARANTÍA con uno restaurado o por uno nuevo.
- Onyx Solar Energy S.L se reserva el derecho a suministrar un módulo equivalente diferente del suministrado inicialmente, para atender las reclamaciones de garantía en el caso de que haya cesado la fabricación del módulo original o las especificaciones iniciales hayan sido modificadas.
- Onyx Solar Energy S.L no es responsable de, y el cliente acepta hacerse cargo de los costes de cualquier mano de obra local o cualquier coste asociado a la instalación, eliminación, reinstalación o transporte del módulo y/o cualquier otro componente asociado sujeto a servicio durante la garantía proporcionada.

La garantía aquí ofrecida será aplicable solo si el producto es (i) propiedad del comprador inicial que adquirió este producto para su uso propio y no para reventa o (ii) si fue adquirido como resultado de la compra de la propiedad inmobiliaria donde el producto fue instalado.

La validez de la presente garantía no se extenderá más allá del periodo original especificado y descrito en las secciones A) y B) del presente certificado.



3. EXCLUSIONS AND LIMITATION OF WARRANTY

The warranties herein offered do not cover damage, failure or defects caused by:

- Not following the installation, functioning or maintenance instructions offered by Onyx Solar Energy S.L
- Reparations, modifications or manipulation of the modules object of the present WARRANTY done by any other person that is not a technician authorized by Onyx Solar Energy S.L, or if the PV glass/glass modules are connected to non-recommended equipment.
- Misuse or negligent acts.
- Damage caused by over tension, atmospheric discharge, fire, floods, plague, acts of god, accidental breakage, actions by third parties and other events or accidents beyond reasonable control by Onyx Solar Energy S.L and those that do not occur under normal operating conditions.
- Breakage of the laminates if the modules are installed on systems not recommended by Onyx Solar Energy S.L.

PV modules with manipulated series number or non-recognizable identification shall not be subject to the WARRANTY.

Onyx Solar Energy S.L does NOT give any WARRANTY, explicit or implicit, different from the warranties herein expressed and is not guaranteeing nor responsible for suitability of the module for any purpose.

3. EXCLUSIONES Y LIMITACIONES DE LA GARANTÍA

Las garantías aquí ofrecidas no cubren el daño, fallo o defecto causado por:

- No seguir las instrucciones de instalación, funcionamiento o mantenimiento establecidas por Onyx Solar Energy S.L
- Reparaciones, modificaciones o manipulaciones de los módulos objeto de la presente GARANTÍA realizadas por cualquier persona que no sea un técnico autorizado por Onyx Solar Energy S.L, o si módulos de vidrio fotovoltaicos han sido conectados a equipos no recomendados.
- Mal uso o negligencia.
- Daño causado por excesiva tensión, descarga atmosférica, fuego, inundaciones, plagas, actos de fuerza mayor, daños accidentales, acción de terceras partes o cualquier otro suceso o accidente fuera del control razonable de Onyx Solar Energy S.L y aquellos que no ocurren bajo condiciones operativas normales.
- Daños de los laminados si los módulos están instalados en sistemas no recomendados por Onyx Solar Energy S.L.

Aquellos módulos fotovoltaicos con números de serie manipulados o sin identificación reconocible no estarán sujetos a esta GARANTÍA.

Onyx Solar Energy S.L NO concede ninguna GARANTÍA, explícita o implícita, diferente a las garantías aquí expresadas y no garantiza ni es en ningún caso responsable de la idoneidad o validez del módulo para ningún fin determinado.



4. CLAIM FOR THE SERVICE UNDER WARRANTY AND/OR INFORMATION ABOUT THE OPTIONS FOR DISPOSITION AND RECYCLING.

Onyx Solar Energy S.L is not responsible for any special, incidental, consequential or punitive damage that may result from the use or lack of use or failure of the module to perform the guaranteed function, including but not limited to damages for requested services, costs of substitution services, lost benefits or savings, and expenses resulting from lawsuit against third parties. The maximum responsibility of Onyx Solar Energy S.L under any WARRANTY, explicit or implicit or established by law or due to any manufacturing or design defect, is limited to the purchase price of the product. The buyer's exclusive remedy for non-compliance of the WARRANTY or for manufacturing or design defect is only the one herein stated.

If at any time any controversy shall arise between BUYER and Onyx Solar Energy S.L regarding the warranties provided in this certificate, the parties hereto agree to attend mediation. In the event mediation is unsuccessful, both parties agree to submit any dispute to binding arbitration, before one arbitrator in Ávila, Spain, under the rules of Arbitration of the "Corte Española de Arbitraje", and that any award shall be enforceable in a court of competent jurisdiction.

To obtain technical service under WARRANTY or options for waste and/or recycling, please contact Onyx Solar Energy. The contact numbers can be found at <http://www.onyxsolar.com>

4. RECLAMACIÓN DE SERVICIOS BAJO GARANTÍA Y/O INFORMACIÓN SOBRE LAS OPCIONES DE DESECHO Y RECICLAJE.

Onyx Solar Energy S.L no es responsable de ningún daño especial, incidental, consecuente, punitivo o por daños o perjuicios que pueda resultar del uso o falta de uso o fallo del módulo para realizar su función garantizada, incluyendo daños por servicios solicitados, costes de servicios de sustitución, beneficios o ahorros perdidos, y gastos derivados de procesos legales contra terceras partes. La máxima responsabilidad de Onyx Solar Energy S.L bajo cualquier GARANTÍA explícita o implícita o establecida por ley o debida a cualquier defecto de fabricación o diseño, está limitada al precio de compra del producto. La compensación exclusiva para el comprador por el no cumplimiento de esta GARANTÍA o por defecto de fabricación o diseño es solamente la aquí expuesta.

Si en cualquier momento surge cualquier controversia entre el COMPRADOR y Onyx Solar Energy S.L relacionada con las garantías estipuladas en este certificado, las partes acuerdan someterse a mediación. En caso de que la mediación no sea efectiva, ambas partes están de acuerdo en someterse a arbitraje vinculante, frente a un árbitro, en Ávila, España, bajo las normas de arbitraje de la Corte Española de Arbitraje y a que el laudo recibido sea vinculante y ejecutable ante cada tribunal de jurisdicción competente.

Para obtener servicio técnico bajo GARANTÍA u opciones para el desecho o reciclaje, por favor contacte a Onyx Solar Energy. Nuestros teléfonos de contacto pueden encontrarse en <http://www.onyxsolar.com>



In the case of a claim according to this WARRANTY the post-sale department will activate the internal general procedure for claims and once analyzed the client will be informed of the corrective actions to be taken.

5. COMING INTO FORCE OF THE PRESENT DOCUMENT.

The present certificate, that modifies any previous existing document, will come into force on the XXXXXXXX, XXth, 20XX and will apply to the specific project described in this submittal.

6. COMING INTO FORCE OF THE WARRANTY.

The effect of the present WARRANTY will commence on the day of the initial purchase by the client, whose name appears in the present WARRANTY certificate.

| | |
|----------------------|--|
| CLIENT | |
| PURCHASE DATE | |
| DELIVERY NOTE | |

En el caso de una reclamación acorde a esta GARANTÍA, el departamento de postventa comenzará los procedimientos generales internos para reclamaciones y una vez analizada, el cliente será informado de las acciones correctivas que se tomarán.

5. ENTRADA EN VIGOR DEL PRESENTE DOCUMENTO.

El presente certificado, que modifica cualquier documento existente anteriormente, tendrá como fecha de entrada en vigor el XX, XXXXXXXX, 20XX y aplicará al proyecto específico descrito en este manual.

6. FECHA EFECTIVA DE LA GARANTÍA.

Los efectos de la presente GARANTÍA comenzarán el día del pedido inicial efectuado por el cliente, cuyo nombre aparece en este certificado de GARANTÍA.

| | |
|------------------------|--|
| CLIENTE | |
| FECHA DE COMPRA | |
| ALBARÁN | |

OFFICIAL STAMP OF THE COMPANY

SELLO OFICIAL DE LA EMPRESA

