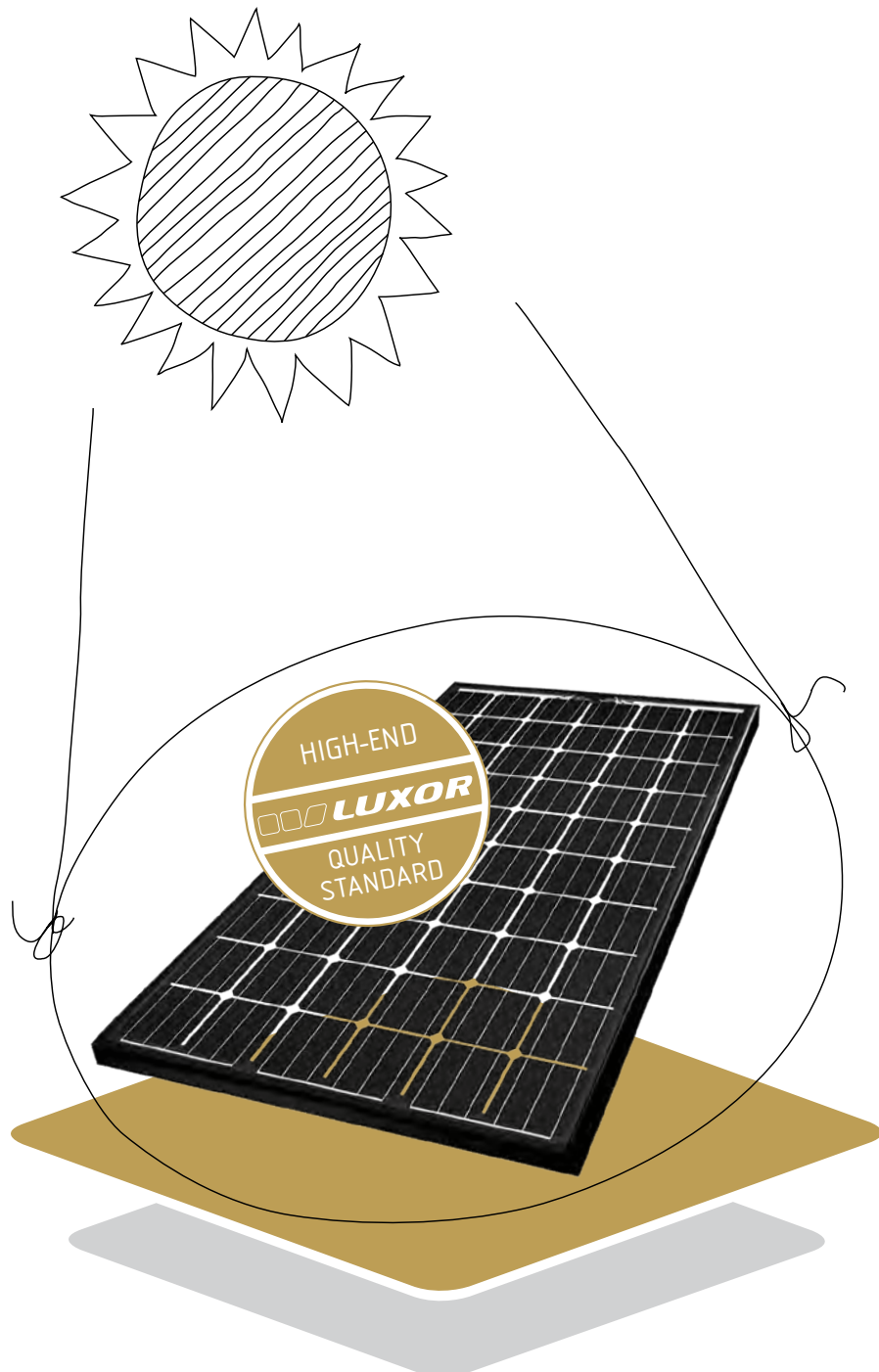


SECURE LINE

Glass-glass module family
The premium solar module



SECURE LINE THE PREMIUM CLASS OF SOLAR MODULES



With its new premium Secure Line glass-glass range, Luxor Solar has linked its top class solar modules with its proven expertise from the glass industry.

The 60-cell glass-glass module is the first choice for demanding operators. Secure stands for ground-breakingly high quality in its key components and the resulting unique longevity that this brings. Glass panels on the front and rear of the module ensure high mechanical load capacity and fire resistance.

A special sealant on the edge of the laminate, which is also used in the production of laminated safety glass, guarantees absolute protection against moisture and other environmental influences. A type of Poly-Vinyl-Butyral (PVB) specially developed for use in photovoltaics is used in the laminate instead of Ethylene-Vinyl-Acetate (EVA). Thanks to its higher degree of transmission, PVB ensures better yields, as well complete

protection against potential induced degradation (PID).

Each additional year added to the lifespan of the PV system is another year of kilowatt hours saved. Guarantees up to 50 years ensure sustainable independence from energy suppliers as well as lower energy costs. As a result, the yield of the PV system increases accordingly.

The technical components and production methods used in the Luxor Secure Line module mean that you can expect an above-average lifespan. Luxor Solar guarantees this with a 50-year laminate guarantee as well as a 35-year product and performance guarantee. The glass-glass module is therefore the best solution for all applications requiring exceptional longevity, reliability and durability.

Premium: Longer lifespan guarantees higher yields

The Luxor Secure Line has various advantages. A premium module for safety-conscious and environmentally conscious customers who appreciate excellent quality.

- + Maximum longevity
- + Longest guarantees, highest assurances
- + For the highest aesthetic standards
- + Stands up to extreme environmental conditions
- + For translucent applications such as carports or conservatories



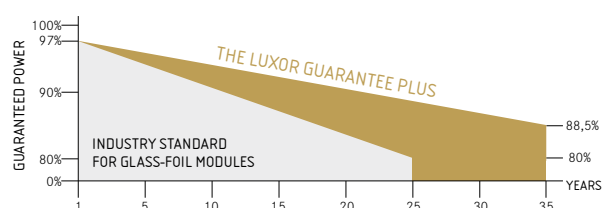
laminate guarantee¹



product guarantee¹



linear performance guarantee¹



¹: The specific warranty conditions are given under www.luxor-solar.com/en/downloads.html

SECURE LINE 60

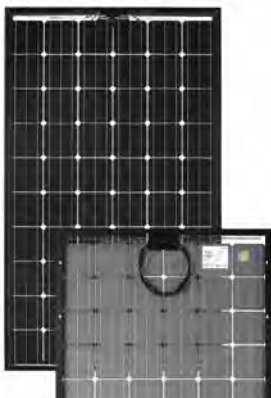
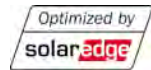
The 60-cell glass-glass Secure Line module is available in various versions and optionally also as smart module. The transparent models are available with monocrystalline and polycrystalline cells and are the perfect choice for translucent applications.



TRANSPARENT
EDITION
POLYCRYSTALLINE

ALSO
FRAME-
LESS

OPTIONAL AS
SMART MODULE



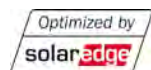
TRANSPARENT
EDITION
MONOCRYSTALLINE

OPTIONAL AS
SMART MODULE



BLACK
EDITION
MONOCRYSTALLINE

OPTIONAL AS
SMART MODULE



3 GOOD REASONS

A golden rule and three good reasons for Luxor solar modules: „All our modules are manufactured with the quality awareness of German engineers. That guarantees reliable, high-performance PV modules with the same durable quality.



Longlife tested



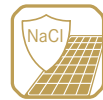
Selection of
components



Back glass



Edge-Sealing



Salt mist
resistant



Ammonia
resistant



Safety provided



100% PID
free cells



Special packing to
avoid micro cracks
in the cells



German
warrantor



Increased
fire safety



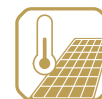
Low glare



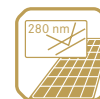
Power proofed



Performance surplus
of 0 Wp to 6.49 Wp



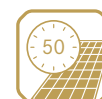
Higher heat
dispensing



Wider light
spectrum absorbed



Ultra thin
front glass



Longest lifespan

SECURE LINE

PROVEN EXPERTISE

FROM THE GLASS INDUSTRY



Tried and tested as windscreens

The invention of laminated safety glass was a milestone in the history of the automobile. The transparent, tear-resistant plastic film that is „baked“ onto the inner and outer glass pane prevents the windscreen shattering

into splinters and hitting the occupants, as the shards of glass stick to the film. By adopting this technology, Secure Line is currently one of the safest and most durable glass-glass modules on the market.



Conventional glass-glass module

EVA lamination

Unsealed modul edges of the module (open edges)

Conventional lamination technique

- + Tension from physical pressure and heat

Luxor Secure Line glass-glass module

PVB lamination

- + Up to 4 % higher yield through the use of a wider light spectrum
- + Longer lifespan due to better absorption of UVA and UVB rays

Thermal sealed modul edges

- + Longer lifespan due to 100 % water resistance of the module perimeter

Unique lamination technique

- + Adapted from the glass/automotive industry
- + Tried and tested in laminated safety glass screens such as windscreens for over 50 years
- + Tension-free through generation of vacuum and atmospheric pressure

DURABLE RELIABLE

Lamination technique

The Luxor Secure Line modules are laminated without mechanical action on the PV cells, which is decisive in the lifespan and performance of the semiconductor.

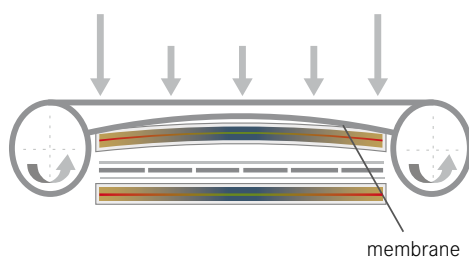
The technology of laminating with a lower temperature and atmospheric pressure is based on the expertise from the glass industry and guarantees a longer life-span for the modules.



LUXOR SECURE LINE LAMINATION PROCESS

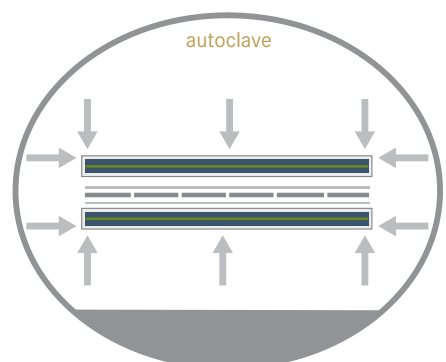
CONVENTIONAL GLASS-GLASS MODULE LAMINATION PRESSURE TRANSMISSION VIA MEMBRANE

Higher mechanical pressure on the outside of the module



LUXOR SECURE LINE LAMINATION PRESSURE-FREE TRANSMISSION

Equal atmospheric pressure on to the top glass of PV module



- Higher tension zone
- Zero tension zone

RELIABLE RESISTANT

Thermal edge sealing

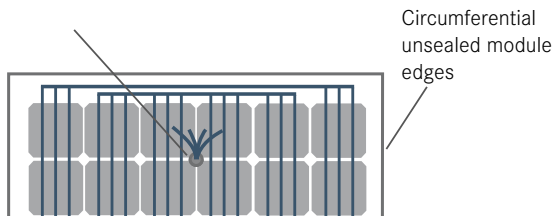
In particular, the PV industry is currently battling with weak seals, a problem faced by the glass industry 50 years ago. The decisive breakthrough came with the introduction of insulating glass units (IG) to the production process.

Thermal edge sealing with butyl, also used in the production of windshields, ensures robust protection against UVA and UVB rays, moisture, ammonia and salt corrosion, and thus ensures a lifespan increase of up to 50 percent.

100 % OUTWARD THERMOPLASTIC INSULATION

Standard glass-glass module

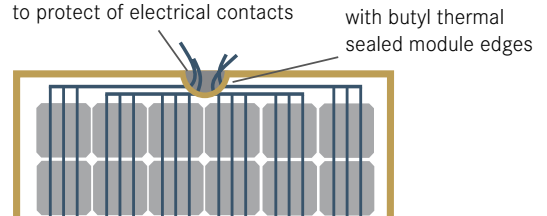
Cut out hole for electrical contacts



- Cut out hole through encapsulation material and backglass

Luxor Secure Line glass-glass module

Cut out hole on the top of module to protect of electrical contacts



- Circumferential butyl seal
- Protection of electrical contacts on the top of the module backglass

Consistent expansion and contraction

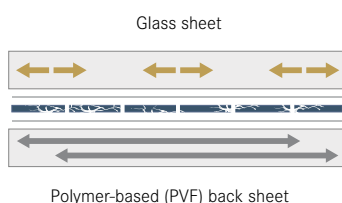
In contrast to standard modules, in glass-glass modules identical materials are used on the front and the back. Thanks to the identical physical conditions, the module can withstand higher stress caused for example by

temperature fluctuations, heavy loads and strong winds. Properties which significantly extend the lifespan of glass-glass modules, especially in hot and humid climates.

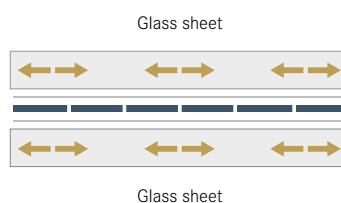
THERMAL AND MECHANICAL EXPANSION OF ENCAPSULATING MATERIAL



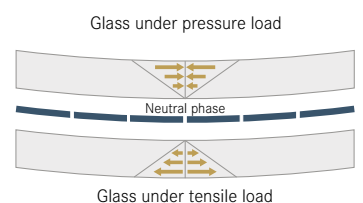
CONVENTIONAL PV MODULE.
VARIABLE THERMAL EXPANSION BETWEEN GLASS AND POLYMER FILM.



LUXOR SECURE LINE MODULE.
EQUAL THERMAL EXPANSION ON FRONT AND BACK GLASS.



NO PRESSURE AND TENSILE LOAD IN THE NEUTRAL PHASE. CELLS ARE OPTIMAL PROTECTED AGAINST MECHANICAL STRESS.



LINEAR TEMPERATURE EXPANSION COEFFICIENTS: GLASS: 9.0(10-6/K), POLYVINYL FLUORIDE (PVF): 50(10-6/K)

RESISTANT HIGH-YIELD

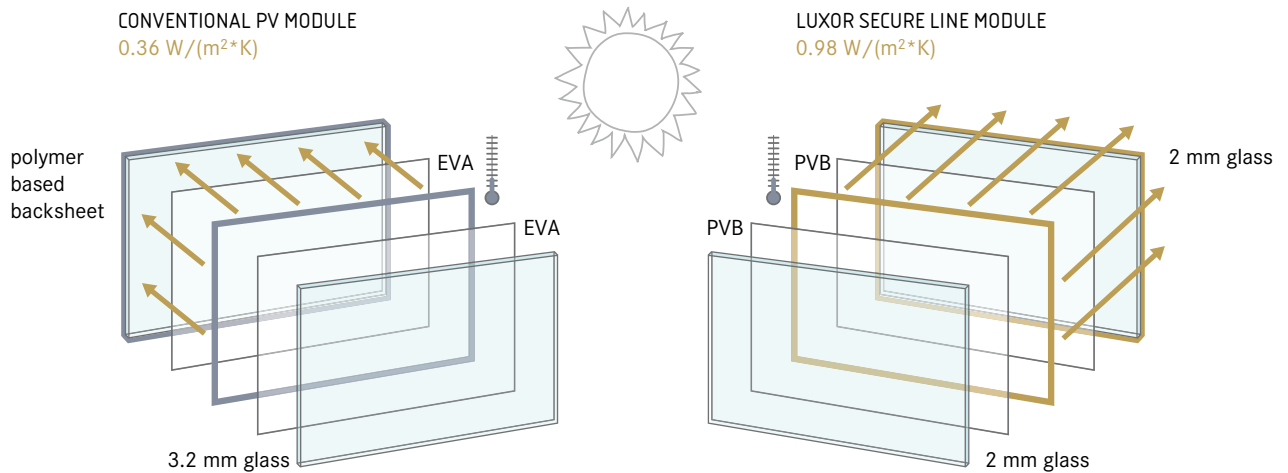
Ultra-thin front glass

The front glass used in Secure Line is only 2 mm thick. The glass is thus translucent, ensuring yields up to two percent higher than in conventional solar modules.

Low heat transfer coefficient

This unique technology enables a heat transfer coefficient of $0.98 \text{ W}/(\text{m}^2 \cdot \text{K})$, which is three times as high as with standard modules. That means triple the heat dissipation levels and again, yields up to two percent higher.

HEAT DISSIPATION OF LUXOR SECURE LINE MODULES

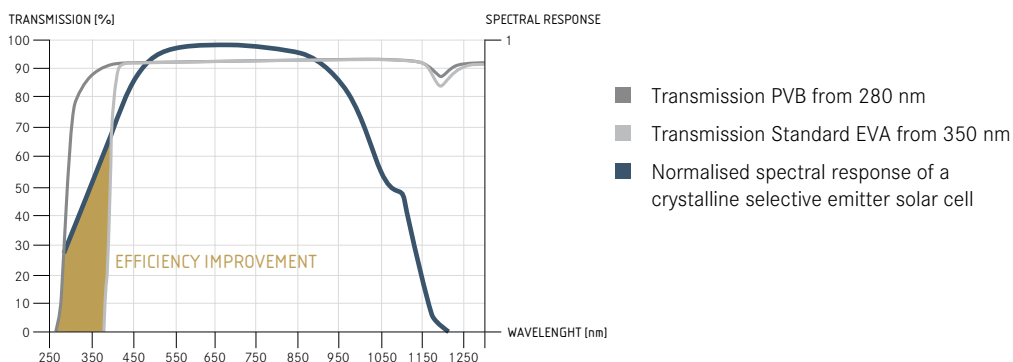


PVB composite layers

To laminate the cells, sheets of PVB are used instead of EVA. PVB is a tried-and-tested material in the production of laminated safety glass, characterised by its excellent resistance to heat, UV rays and environmental influences. As PVB is better able to absorb UVA and

UVB rays, the laminate itself has a 50 % longer lifespan and ensures a significantly longer lifespan of the semiconductor. In addition, PVB uses a 20 % wider spectrum of light, which increases cell efficiency and guarantees yields up to 4 % higher.

HIGHER EFFICIENCY THROUGH PVB



Luxor, your specialised company



Luxor Solar GmbH

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