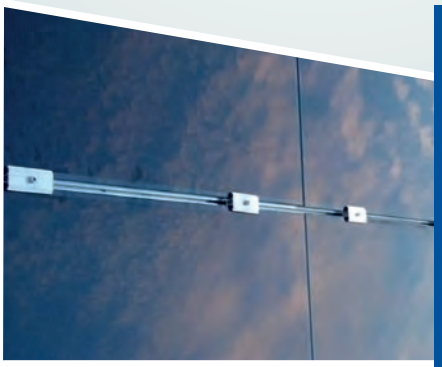
Innovative Technology for
Solar Modules and Glass Panels

BÜRKLE

LAMINATION LINES

Lamination lines Easy-Lam & Ypsator for PV Module & Glass Panel Lamination



Usable for

- **Glass / Glass- or Glass / Backsheet PV Modules**
- **Low or high lamination capacities**
- **All known encapsulates on the market**
- **Crystalline Cells and Thin Film PV Modules**
- **BIPV Modules**
- **Smart Glass Modules**
- **Functional Glasses (e.g. Display)**

Reduction of lamination process time

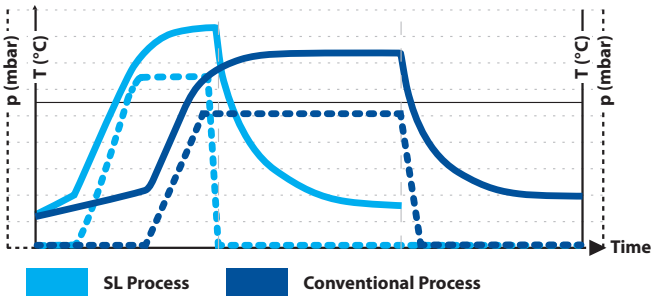
The Bürkle SL Process

- Fastest single step lamination and shortest lamination process time on the market
- Especially designed for Glass/Backsheet modules

The Bürkle SL laminator is designed with the capability for higher process temperatures compared to conventional lamination processes.

As the cross-linking of the encapsulate of a PV module is a result of temperature and time, the lamination time can be reduced by using higher temperatures.

As a result, the Burkle SL laminator can achieve cycle times in a single lamination step comparable to a conventional two-step lamination process. Excellent lamination results at these higher temperatures are achieved by applying a higher lamination holding pressure via the membrane.



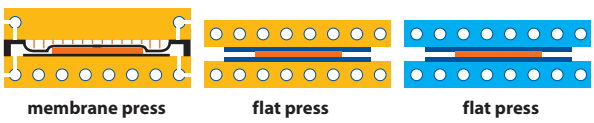
- **Process time for Glass/Backsheet modules reduced by up to 50%**
- **Unique and patented technology**
- **Proven technology, on the market since 2010**
- **Several million modules produced meeting highest quality standards as e.g. ISO 61215 using the SL Process**

The Bürkle VFF Process

- Fastest two step lamination in market
- Especially designed for the fastest Glass/Glass Module lamination process with highest quality
- Greatest flexibility to laminate any kind of Glass/Glass and Glass/Backsheet module known in the market

The Bürkle VFF-Process is a two-step lamination process utilising a vacuum/membrane press in the first step and a double-sided heated flat press in the second step.

A double-sided cooled flat press is used for cooling. The flat press allows uniform, parallel pressing and practically eliminates the "edge pinch" effect at the edges of the module, without using frames during lamination. The double sided heating ensures a faster lamination, homogenously from both sides, and thus minimizing any remaining stress in the module after lamination.



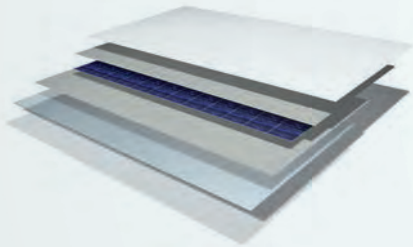
- **Fastest Glass/Glass lamination**
- **Homogeneous double sided heating and cooling**
- **Maximum flexibility, even for Glass/Backsheet modules thanks to optional membrane kit for step 2 and cooling**
- **An approved large-scale production technology**
- **Well suited for very thin glass lamination, and for combination of thin glass / thick glass lamination**

SINGLE STEP LAMINATORS

SL Process for Glass/Backsheet Modules

EASY-LAM SL

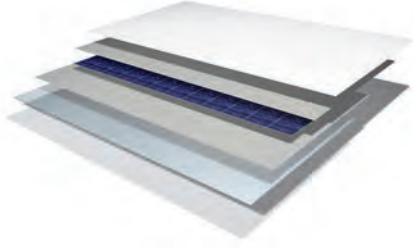
for lower capacities
up to 90 MWp*



Useful lamination area [mm]	2100 x 4100
Number of modules per cycle	4 x 60 cells or 4 x 72 cells
Modules per hour	up to 36 **
Number of lamination steps	1
Heating medium	Thermal oil in combination with steel heating platens
Temperature accuracy [°C]	< ± 2
Cooling unit	optional
Cooling	cooling platen double side or fan cooling

YPSATOR SL

for high capacities
200 - 300 MWp*



Useful lamination area [mm]	2000 x 2200
Number of openings	5 - 7
Number of modules per opening	2 x 60 cells or 2 x 72 cells
Modules per hour	up to 85 @ 5 levels ** up to 100 @ 6 levels ** up to 115 @ 7 levels **
Number of lamination steps	1
Heating medium	Thermal oil in combination with steel heating platens
Temperature accuracy [°C]	< ± 2
Cooling unit	optional
Cooling	cooling platen single side

* depending on module power and annual working hours

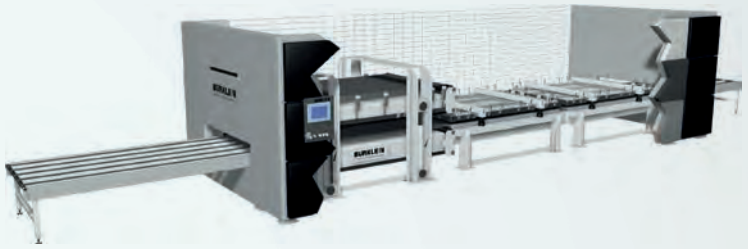
** depending on bill of materials and module built-up

TWO STEP LAMINATORS

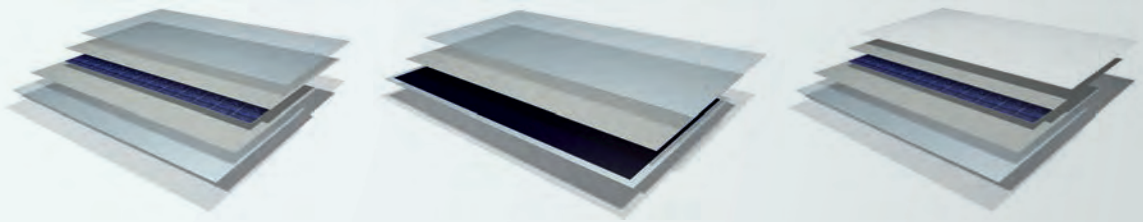
VFF Process for Glass/Glass Modules or Panels
SL Process for Glass/Backsheet Modules

EASY-LAM VFF

for lower capacities up to 100 MWp*



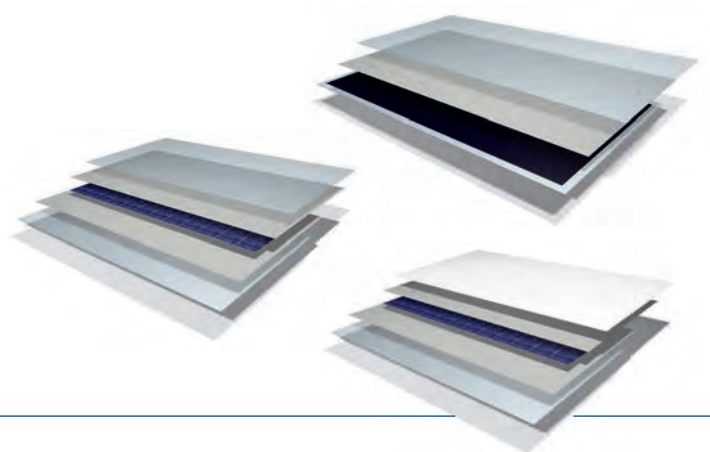
Useful lamination area [mm]	2100 x 4100
Number of modules per cycle	4 x 60 cells or 4 x 72 cells
Modules per hour	up to 42 **
Number of lamination steps	2
Heating medium	Thermal oil in combination with steel heating platens
Temperature accuracy [°C]	< ± 2
Cooling unit	optional
Cooling	double side cooling platen or fan cooling



YPSATOR VFF

for high capacities 180 - 250 MWp*

Useful lamination area [mm]	2000 x 2200
Number of openings	4 - 5, others on request
Number of modules per opening	2 x 60 cells or 2 x 72 cells
Modules per hour	up to 80 @ 4 levels ** up to 100 @ 5 levels **
Number of lamination steps	2
Heating medium	Thermal oil in combination with steel heating platens
Temperature accuracy [°C]	< ± 2
Cooling unit	optional
Cooling	cooling platen double side



INNOVATIVE POWER 4U

Why to choose Bürkle

PRODUCTIVITY

- Short Cycle times (high throughput)
- High Yield
- Low TCO
- Reduced Power Consumption
- Reduced Factory Space Requirements
- Optionally available Ramp-up support with Bürkle technicians

FLEXIBILITY

- Membrane upgrade kit at easy-lam VFF for different module built-ups
- Suited for a wide range of module sizes and thicknesses
- For a wide range of encapsulates such as EVA, PVB, TPO, POE, etc.
- Solutions for crystalline and Thin Film PV, for Glass/Backsheet & Glass/Glass modules as well as for Smart Glass and BIPV
- High flexibility to use different glass thicknesses and cell types
- Lamination of very thin glass (<1mm each glass)
- Lamination of thin glass to thick glass

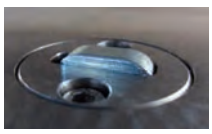
THE UNIQUE BÜRKLE ADVANTAGE

- Process development at the headquarter in Germany
- Lamination Service to support Module Certification
- Process support at customer's site

LAMINATION QUALITY

- Homogenous thermal oil heating system

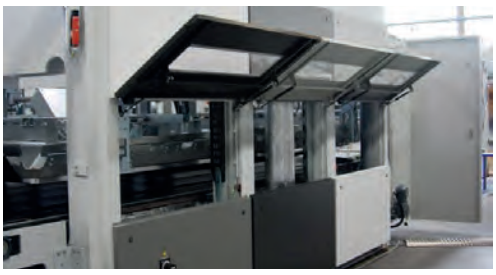
- Double-sided heating and cooling
- Flat press to avoid "edge pinch"
- Including pin system with pins that can be even lifted during module feed-in



- Overpressure to avoid bubbles at high temperature

HIGHEST UPTIME

- Robust design and built for 24/7 operation, with easy access for maintenance
- Production downtime during membrane change only 15-30 minutes
- Highest membrane lifetime with industry standard membranes and now also with newly developed "Burkle lamination sheet"
- Supported by Bürkle worldwide Field Service Team and in-house experts via Burkle Remote Service System (BRSS)
- User friendly GUI, optionally with touch screen



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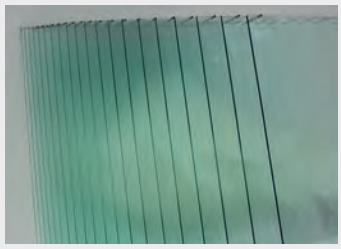
ENGINEERING & SUCCESS
INNOVATIVEPOWER
QUALITY & SERVICE
REAL TEAMSPIRIT

4U

Edition 05/2018; subjects to change



be prepared for
the coming
PV REVOLUTION

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