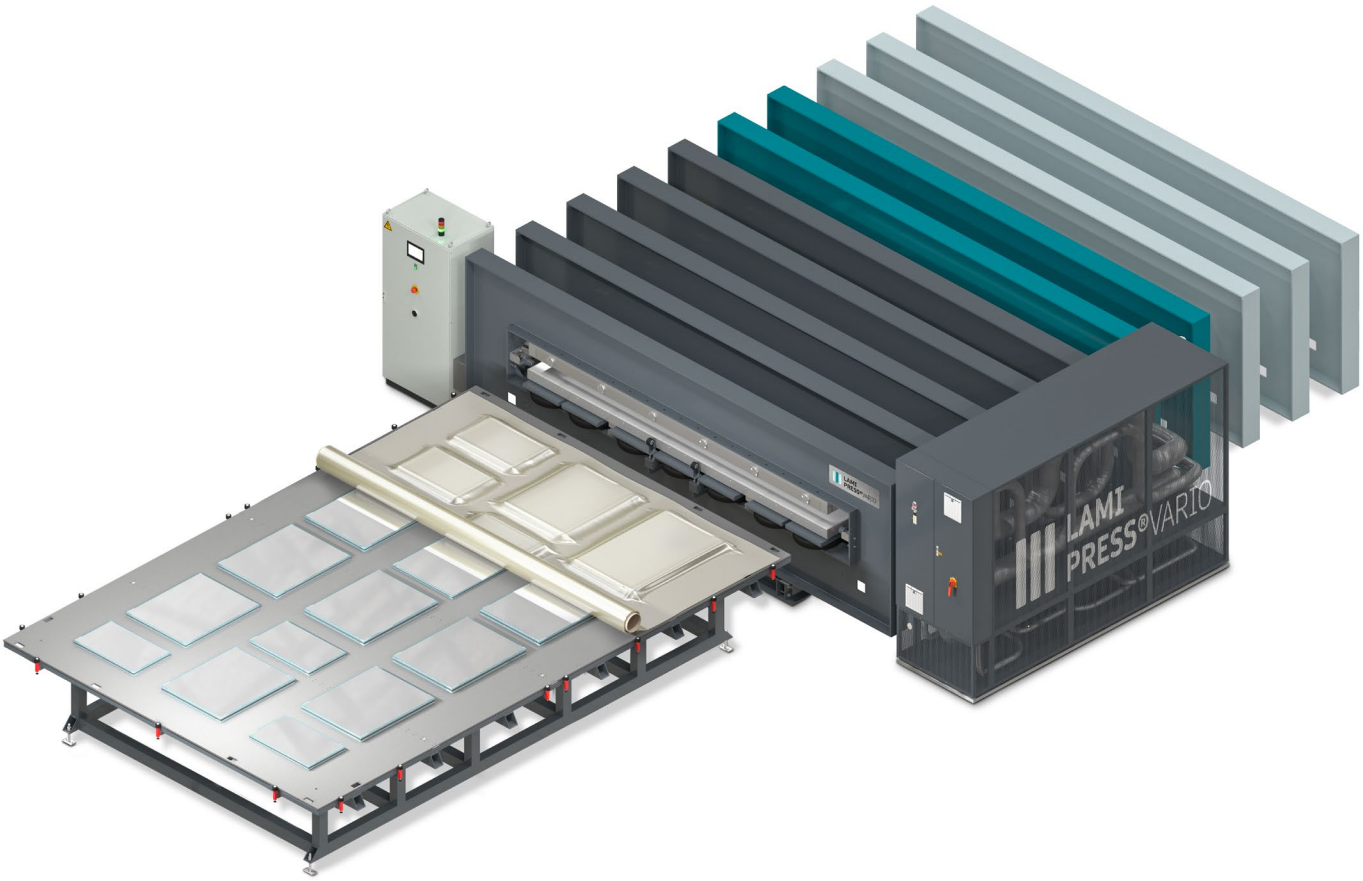
# LAMIPRESS® VARIO




## TABLE OF CONTENTS



## CONTACT US:


**Fotoverbundglas Marl GmbH**
Zechenstraße 7c | 45772 Marl, Germany

Ph. +49 2365 3173
Fax +49 2365 36355
fotoverbundglas@online.de

**lami-press.de**

**Vacuum and autoclave**
In LAMIPRESS®VARIO, energies such as vacuum, overpressure, and contact heat are combined to the **„flat-bed vacuum autoclave“** technology.

—

**Impressing quality!**
LAMIPRESS®VARIO bears the CE mark. Our products are certified according to the Laminated Safety Glass Guidelines.

—

**Variable and efficient**
LAMIPRESS® provides maximum flexibility with regards to equipment and capacity utilization, as well as use of highly diverse glass and composite materials.

**Flexible use**
› Unlimited production diversity
› PVB and EVA films, special types of film, as well as combinations of different films
› Functional final products: fire-protection glass, SentryGlas®, smart glass and much more

**Simply faster**
› Cycle times of approximately 30 to 45 minutes, by contact heat (in the case of an optimum process design)

**Cost-effective**
› Calculable cost of purchase
› Low operating costs thanks to an energy-efficient technology (approximately 9 kWh/m heating surface per cycle)
› No time-consuming clean-air rooms are needed
› No water consumption thanks to open air cooling with a tank pump

| Technical data: | |
|---|---|
| **Heating and cooling equipment** | Heating capacity/device: 20 kW per 1 m² heating surface |
| | Cooling performance/device: 20 kW per 1 m² heating surface |
| | Supply voltage: 400 V three-face current |
| **Heating and cooling plate** | Surface finish: silver-anodized |
| | Operating temperature: max. 160 °C |
| **Cover plate (optional)** | Performance: 4 kW/m² |
| **Control system** | Type: WAGO or SIEMENS |
| **Pneumatic bellow System** | Supply pressure: 8 bar |
| **External vacuum pump** | Type: Rotary vane O 5.6, oil-lubricated, air-cooled |
| | Motor: 0.3 kW, 1,350 rpm, 50 Hz, 220 V |
| | Performance: up to -970 mbar |
| **Process area** | Operating pressure: 1.2 bar |
| | Process vacuum: max. -900 mbar |
| | Max. feed height: 95 mm |

| Consumption rates: | |
|---|---|
| **Energy** | 8–10 kWh/m² heating surface per cycle (depending on the glass package thickness) |
| **Water** | 150 litres/m² heating surface per cycle |
| | With free-air cooling and tank pump system: 0 litres/m² heating surface per cycle |
| **Cycle times** | About 30–45 minutes (depending on the glass package thickness) |

## MACHINE SIZE
TAILORED TO THE CUSTOMER'S NEEDS

1. **Minimum area of LAMIPRESS®VARIO =** desired throughput per day ÷ $\frac{\text{working hours per day}}{\text{cycle time}}$ ÷ dimensioning factor

2. **Length and width of LAMIPRESS®VARIO =** maximum desired dimensions of the end products + 50 cm added to the length and width

**EXAMPLE:**

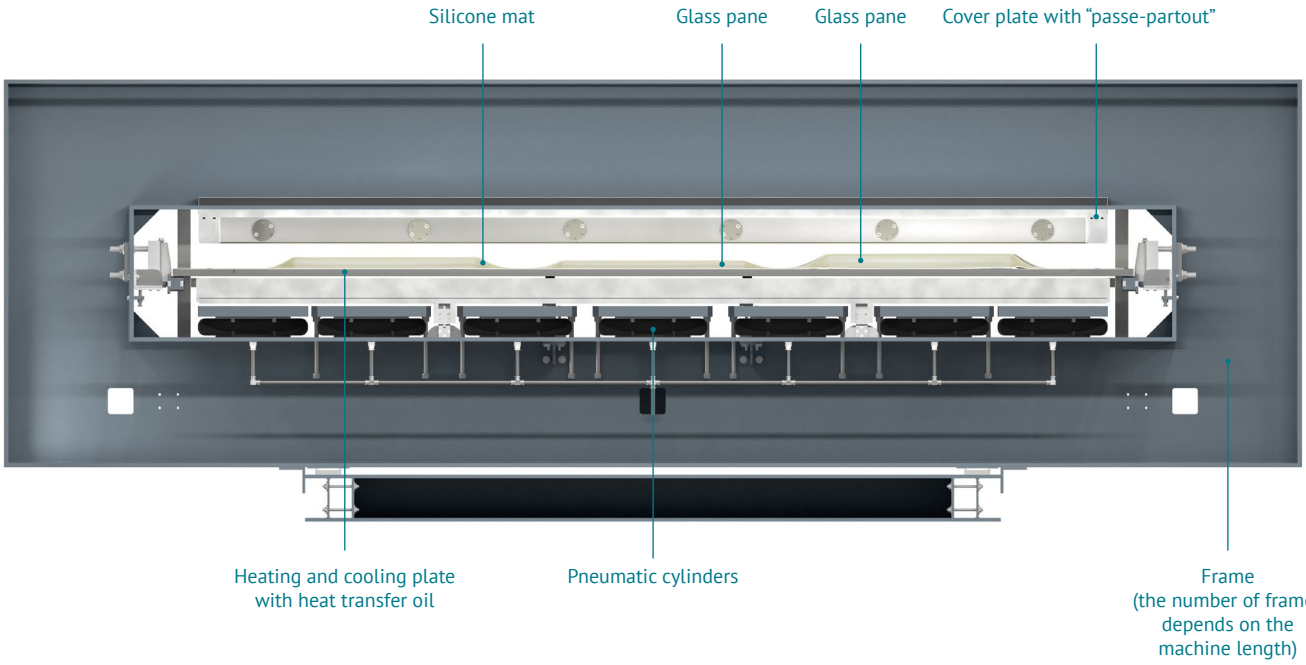
**Specifications** (*customer request* | fixed value)

| | |
|---|---|
| *Target throughput per day:* | **50 m²** |
| *Working hours per day:* | **8** |
| Cycle: | **¾-hour** |
| Dimensioning factor: | **0.7** |
| *Maximum size of the final product:* | **3 m x 2 m** |

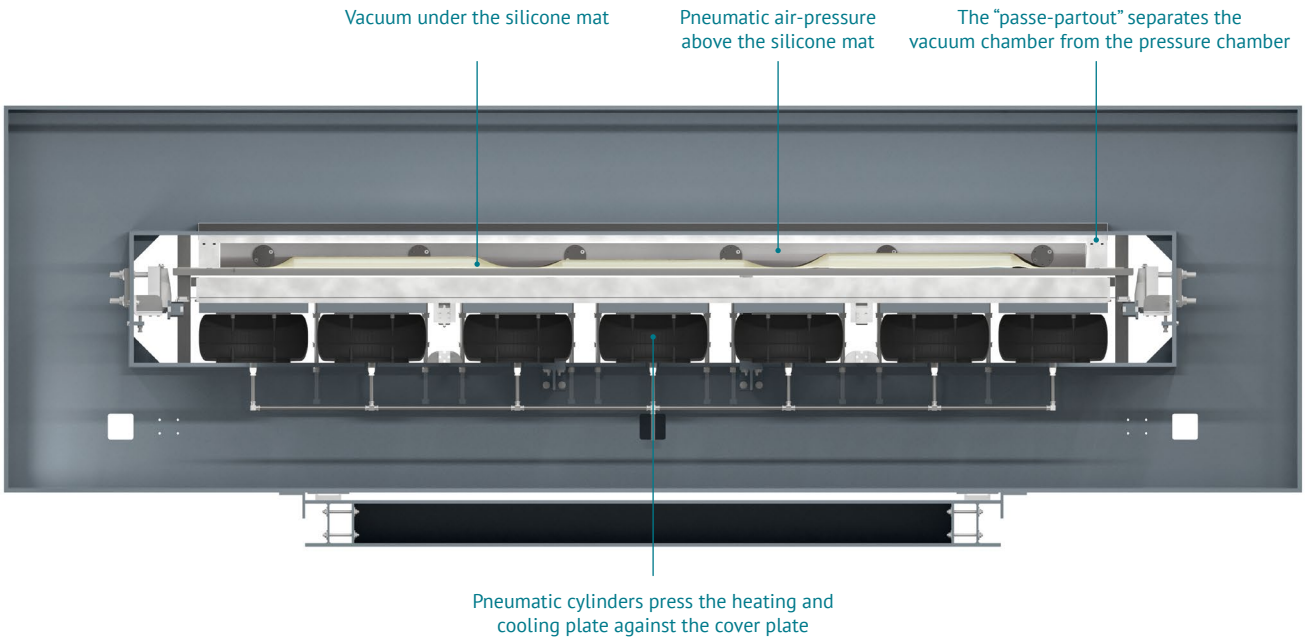
1. 100 m² ÷ $\frac{8}{0.75}$ ÷ 0.7 **= 14.29 m²**

2. 3.24 m (maximum width) x 4.41 m (adjust the length to the throughput) + add 50 cm to the length and width **= 3.74 m x 4.91 m**

**1. Opened machine:**




**2. Closed machine:**

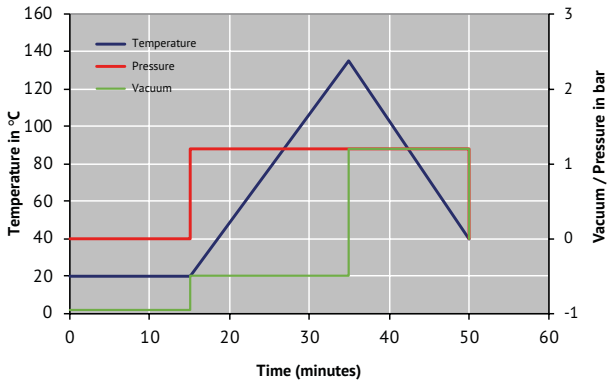


# TECHNOLOGIC PROCESSES
## OF COMPOSITE MANUFACTURING OVERVIEW

LAMI PRESS®

### A PROCESS PVB

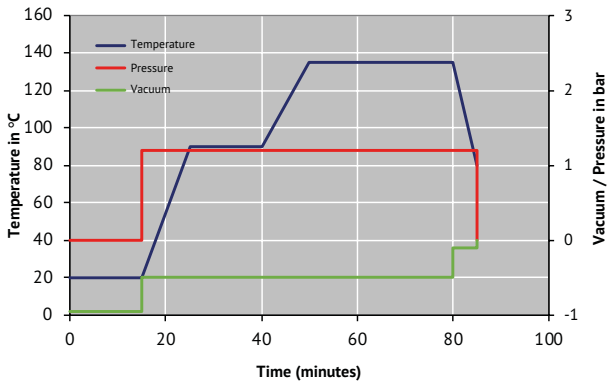
**Composite production process for float 4 mm / 0.76 mm PVB / float 4 mm**




| A \| PROCESS PVB | Time | Temp. | Pressure | Vacuum |
|---|---|---|---|---|
| **Cold vacuum** at room temperature | 0.00 | 20.00 | 0.00 | –0.95 |
| **Start of the heating stage** | 15.00 | 20.00 | 0.00 | –0.95 |
| **Adjust the process vacuum** | 15.00 | 20.00 | 0.00 | –0.50 |
| **Adjust the excess pressure** | 15.00 | 20.00 | 1.20 | –0.50 |
| **Start of the dwelling stage** | 35.00 | 135.00 | 1.20 | –0.50 |
| **Surrounding coverage** | 35.00 | 135.00 | 1.20 | 1.20 |
| **Start of the cooling stage** | 50.00 | 40.00 | 1.20 | 1.20 |
| **Machine opens** | 50.00 | 40.00 | 0.00 | 0.00 |

### B PROCESS EVA

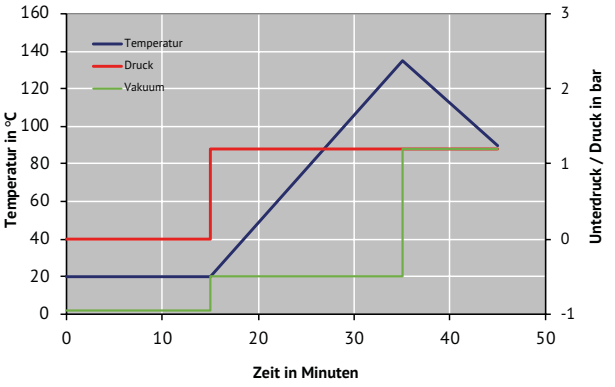
**Composite production process for float 4 mm / 0.76 mm EVA / float 4 mm**




| B \| PROCESS EVA | Time | Temp. | Pressure | Vacuum |
|---|---|---|---|---|
| **Cold vacuum** at room temperature | 0.00 | 20.00 | 0.00 | –0.95 |
| **Start of the heating stage** | 15.00 | 20.00 | 0.00 | –0.95 |
| **Adjust the process vacuum** | 15.00 | 20.00 | 0.00 | –0.50 |
| **Adjust the excess pressure** | 15.00 | 20.00 | 1.20 | –0.50 |
| **Heat up** | 25.00 | 90.00 | 1.20 | –0.50 |
| **EVA film flow stage** | 40.00 | 90.00 | 1.20 | –0.50 |
| **End of the flow phase, further heating** | 50.00 | 135.00 | 1.20 | –0.50 |
| **Cure temperature / dwelling stage** | 80.00 | 135.00 | 1.20 | –0.50 |
| **End of dwelling stage** | 80.00 | 135.00 | 1.20 | –0.10 |
| **Stress-relief stage** | 85.00 | 80.00 | 1.20 | –0.10 |
| **Cooling** | 85.00 | 80.00 | 0.00 | 0.00 |
| **Opening the machine** | | | | |
| **After-cooling** (at more than 3 °C/min.) by ventilators, outside the machine | | | | |

### C PROCESS SENTRY

**Verbundprozess für Float 4 mm / 0,76 mm Sentry / Float 4 mm**




| C \| PROCESS SENTRY | Time | Temp. | Pressure | Vacuum |
|---|---|---|---|---|
| **Cold vacuum** at room temperature | 0.00 | 20.00 | 0.00 | –0.95 |
| **Start of the heating stage** | 15.00 | 20.00 | 0.00 | –0.95 |
| **Start of the dwelling stage** | 15.00 | 20.00 | 0.00 | –0.50 |
| **Surrounding coverage** | 15.00 | 20.00 | 1.20 | –0.50 |
| **Start of the cooling stage** | 35.00 | 135.00 | 1.20 | –0.50 |
| **End of the cooling stage** | 35.00 | 135.00 | 1.20 | 1.20 |
| **Machine opens** | 45.00 | 90.00 | 1.20 | 1.20 |
| **After-cooling** (at more than 3 °C/min.) by ventilators, outside the machine | 45.00 | 90.00 | 0.00 | 0.00 |

| | Autoclave pre-lamination | No autoclave | Autoclave vacuum bag | LAMIPRESS® |
|---|---|---|---|---|
| **Product range** | › Includes mostly PVB-based products | › Includes mostly composites with EVA film<br>› PVB film use is limited | › **both EVA and PVB films are possible** | › **PVB and EVA films are possible without any restrictions**<br>› **Particularly well suitable for special types of film, such as SentryGlas®**<br>› **Combinations of the different types of film is also possible** |
| **Production** | › **Unrivalled in terms of efficiency for simple composites of the belt size**<br>› Lack of economic viability for special sizes and small batch sizes<br>› Long cycle times<br>› Poor flexibility and availability | › High reject rate and quality shortcomings in the case of non-EVA products<br>› Low throughput<br>› Poor flexibility and availability | › Quality defects, such as edge pitching, delamination and edge offset<br>› Vacuum bag is not reusable<br>› Often inefficient positioning in the autoclave (horizontal)<br>› Poor flexibility and availability | › **Cycle times of less than 45 minutes by means of contact heating** (In the case of optimum process design)<br>› **Reject rate less than 1%** (absolute process security)<br>› **The highest quality level**<br>› **Almost no additional material consumed** |
| **Cost** | › High operating and initial (purchase) costs (in particular due to the inefficient heating by convection) | › **Apparently low purchase costs**<br>› Rapidly growing cost because of necessary additional purchases<br>› High operating costs (expensive and time-consuming conditioning rooms, convection heating) | › High operating and initial (purchase) costs<br>› Consumes the same amount of energy as the autoclave pre-lamination technology, but the throughput is significantly lower | › **Low initial and purchase costs** (no additional purchases are needed)<br>› **Low operating costs** (the most energy-efficient technology) |

## CONTACT US:

**Fotoverbundglas Marl GmbH**
Zechenstraße 7c | 45772 Marl, Germany

Ph. +49 2365 3173
Fax +49 2365 36355
fotoverbundglas@online.de

**lami-press.de**