# CERTIFICATE

**Certified Passive House Component**

Component-ID 2537vs03 valid until 31st December 2026

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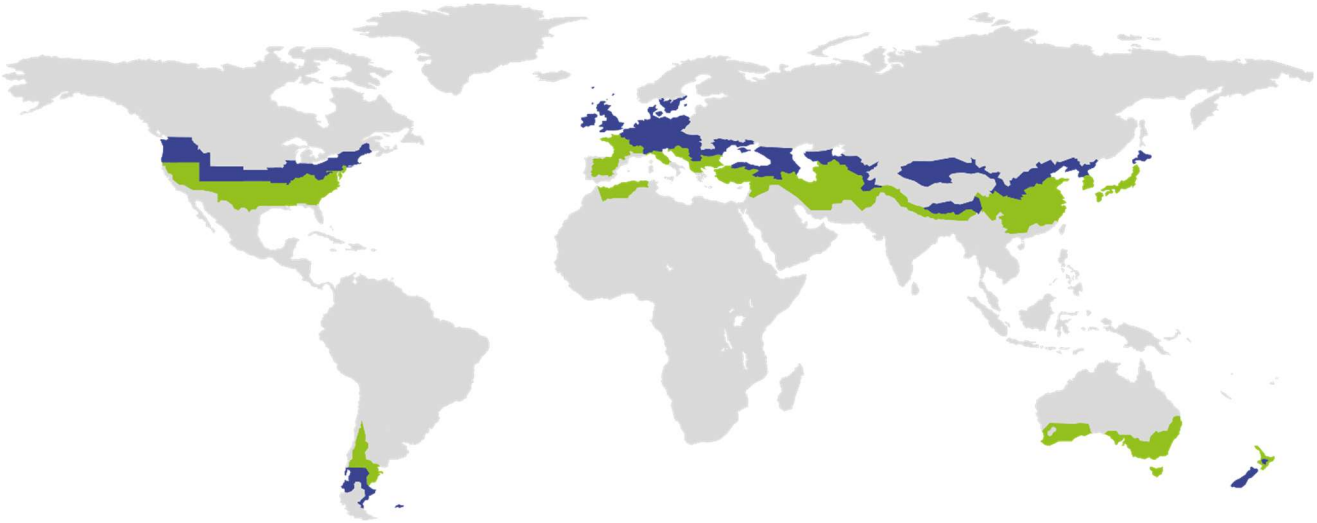

| | |
|---|---|
| Category: | **Air handling unit with heat recovery** |
| Manufacturer: | **bluMartin GmbH** |
| | **Germany** |
| Product name: | **freeAir 100e ERV with and without channel interface** |
| Specification: | Decentralised single room ventilation system |
| Heat exchanger: | Recuperative |

**This certificate was awarded based on the product meeting the following main criteria**

| | | | |
|---|---|---|---|
| Heat recovery rate | $\eta_{HR}$ | ≥ | 75 % |
| Specific electric power | $P_{el,spec}$ | ≤ | 0.45 Wh/m³ |
| Leakage | | < | 3 % |
| Performance number | | ≥ | 10 |
| Comfort | Supply air temperature ≥ 16.5 °C at outdoor air temperature of -10 °C | | |

| Airflow range |
|---|
| 10 – 50 m³/h [1)] (continuous operation) |
| 10 – 85 m³/h [1)] (on-demand operation for elimination of increased loads) |
| **Heat recovery rate** |
| $\eta_{HR}$ = 86 % |
| **Specific electric power** |
| $P_{el,spec}$ = 0.36 Wh/m³ |
| **Humidity recovery** |
| $\eta_x$ = 61 % |

1) The air flow rate applies to the "Premium Cover" device variant due to its acoustic performance. Other device variants are listed in the appendix to the certificate.

cool, temperate climate

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**Volume flow rate**

Due to the acoustic properties of the ventilation unit (see section on acoustic), the following volume flow ranges apply to the different unit variants. A sound pressure level of 25 dB(A) must be maintained for continuous operation in living rooms. The on-demand operation range is used for elimination of increased loads.

| Variant | Air flow range continous operation [m³/h] | Air flow range On-demand operation [m³/h] |
|---|---|---|
| Premium Cover | 20 – 50 | 20 – 85 |
| Front-Cover III | 20 – 40 | 20 – 60 |
| Standard Frontplatte | 20 – 30 | 20 – 50 |

**Humidity recovery**

Indoor air humidity can be increased by using a system with moisture recovery in a cool, temperate climate, especially during the winter. These higher humidity levels will reduce evaporation from building elements and furniture during the heating period and thus have a positive effect on the building's heating demand. In order to account for this effect, the heat recovery efficiency is increased by a certain percentage, depending on the achieved level of moisture recovery.

| Humidity recovery |
|---|
| $\eta_x$ = 61 % |

For humidity recovery levels > 60% humidity-controlled volume flow control is recommended to prevent damage caused by intermittently excessive indoor air humidity.

- To ensure humidity-controlled volume flow control, the device is equipped with a humidity sensor on the exhaust air side as default. In comfort mode (standard operating mode), the air quality is automatically maintained at or below a preset humidity level according to the selected comfort level.

Limits of moisture recovery:

- In cool, temperate climates, heat exchangers with humidity recovery should generally only be used if, due to the type of use, only relatively low humidity loads are to be expected in the building (e.g., in residential buildings with below-average occupancy density).
- If moisture recovery > 60 % is to be used in a building with an average occupancy rate and typical use, the energy balance of the building is to be calculated with an increased airflow rate.

**Passive House comfort criterion**

With an outside air temperature of -10°C, a supply air temperature of 16.5°C can be maintained. However, from an outside air temperature of approx. -9°C, the volume flow is reduced in balanced mode.

**Efficiency criterion (heat recovery rate)**

The effective heat recovery rate is measured at a test facility using balanced mass flows of the outdoor and exhaust air. The boundary conditions for the measurement are documented in the testing procedure.

$$\eta_{HR} = \frac{(\theta_{ETA} - \theta_{EHA}) + \frac{P_{el}}{\dot{m} \,.\, c_p}}{(\theta_{ETA} - \theta_{ODA})} + 0.08 \,.\, \eta_x$$

with

| | |
|---|---|
| $\eta_{HR}$ | Heat recovery rate in % |
| $\vartheta_{ETA}$ | Extract air temperature in °C |
| $\vartheta_{EHA}$ | Exhaust air temperature in °C |
| $\vartheta_{ODA}$ | Outdoor air temperature in °C |
| $P_{el}$ | Electric power in W |
| $\dot{m}$ | Mass flow in kg/h |
| $c_p$ | Specific heat capacity in Wh/(kg.K) |
| $\eta_x$ | Humidity recovery in % |
| | for $\eta_x$ > 60 %, the heat recovery increase (0.08 . $\eta_x$) is limited to a maximum of 4.80 % |

The average heat recovery rate for the device tested is as follows:

| Hear recovery rate |
|---|
| $\eta_{WRG}$ = 86 % |

**Efficiency criterion (electric power)**

The electrical power consumption was determined in accordance with a typical device configuration with a duct connection for an external pressure of 50 Pa.

| Specific electric power |
|---|
| $P_{el,spez}$ = 0.36 Wh/m³ |

**Efficiency ratio**

The efficiency ratio provides information about the overall energy performance of the respective ventilation unit. It specifies the achieved reduction in ventilation heat losses by using a ventilation unit with heat recovery rather than without.

| Efficiency ratio |
|---|
| $\varepsilon_L$ = 0.7 |

**Leakage**

The leakage airflow must not exceed 3 % of the average airflow of the unit's operating range. The test to determine the leakages was carried out using the pressure test method.

| Internal leakage | External leakage |
|---|---|
| 2.51 % | 1.66 % |

**Settings and airflow balance**

It must be possible to adjust the balance between the exhaust airflow rate and the outdoor airflow rate for all units.

- This device is certified for airflow rates of 10 – 50 m³/h (continuous operation) resp. 10 – 85 m³/h (on-demand operation for elimination of increased loads).
- Balancing of the airflow rates of the unit is possilbe.
  - ✓ The airflow volumes can be held steady automatically (by constant volume flow fans).
- The users should have at least following possibilities for adjustment:
  - ✓ Switching the system on and off.
  - ✓ Synchronized adjustment of the supply air and extract airflow to basic ventilation (70-80 %), standard ventilation (100 %) and increased ventilation (130 %) with a clear indication of the current setting.
- The standby power consumption of this device makes 0 W. Hereby complies with the target value of 1 W.
- After a power failure, the device will automatically resume operation.

**Indoor air quality**

This unit is equipped with following filter qualities by default:

| Outdoor air filter | Extract air filter |
|---|---|
| ISO ePM1 55% | ISO epm10 80% |

On the outside air side, a fine filter of efficiency ISO ePM1 50% or better is recommended. If not standard, a filter with recommended efficiency is offered as optional equipment or accessory by the manufacterer.

If the device is not operated during the summer, the filter should be replaced before the next operation.

**Acoustical testing**

The noise limits in living rooms of 25 dB(A) for continuous operation and 35 dB(A) for ventilation on demand are complied with within the listed airflow-ranges. Since it can be assumed that the unit will be installed in a living room, the sound pressure level in installation room should be restricted to 25 dB(A).

The following sound levels are achieved by the unit for the different variants as a function of the airflow rate:

| Air flow [m³/h] | 40 | 50 | 60 | 70 | 85 |
|---|---|---|---|---|---|
| Standard Frontplatte<br>Sound power level Lw [dB(A)] | 34 | 38 | 42 | | |
| Standard Frontplatte<br>Sound pressure level at 10 m² of room absorption area (e.g. living room) Lp [dB(A)] | 30 | 34 | 38 | | |
| Front-Cover III<br>Sound power level Lw [dB(A)] | | 32 | 35 | 39 | |
| Front-Cover III<br>Sound pressure level at 10 m² of room absorption area (e.g. living room) Lp [dB(A)] | ≤25 | 28 | 31 | 35 | |
| Premiumcover<br>Sound pressure level Lw [dB(A)] | | | 33 | 36 | 40 |
| Premiumcover<br>Sound pressure level at 10 m² of room absorption area (e.g. living rooms) Lp [dB(A)] | | ≤25 | 29 | 32 | 36 |

**Frosts protection**

Appropriate measures should be taken to prevent the heat exchanger and optional downstream hydraulic heater coil from getting damaged by frost during extreme winter temperatures (−15 °C). It must be ensured that the unit's ventilation performance is not affected during frost protection cycles (an outside air interruption circuit is out of the question in systems suitable for passive houses, because the heating loads occuring as a result of forced infiltration become unacceptably high).

- Frosts protection of the heat exchanger:
  - ✓ The frost protection strategy includes an ourdoor-supply air bypass which is opened gradually as well as the balanced reduction of the operating volume flow from an outside air temperature of approx. -9 °C. It should be noted that the frost protection function can lead to an automatic balanced reduction of the volume flows and thus to a reduced average volume flow (reduced minimum ventilation).
  - ✓ The outside temperature when the frost protection was activated was approx. -9 °C.

**Peculiarity**

Any condensate that may occur is drained to the outside via the outside cover. However, the moisture recovery system should ensure that hardly any condensate occurs under normal use.