# CERTIFICATE

**Certified Passive House Component**

Component-ID 0240vl03 / 0012vl03 valid until 31st December 2025

Passive House Institute
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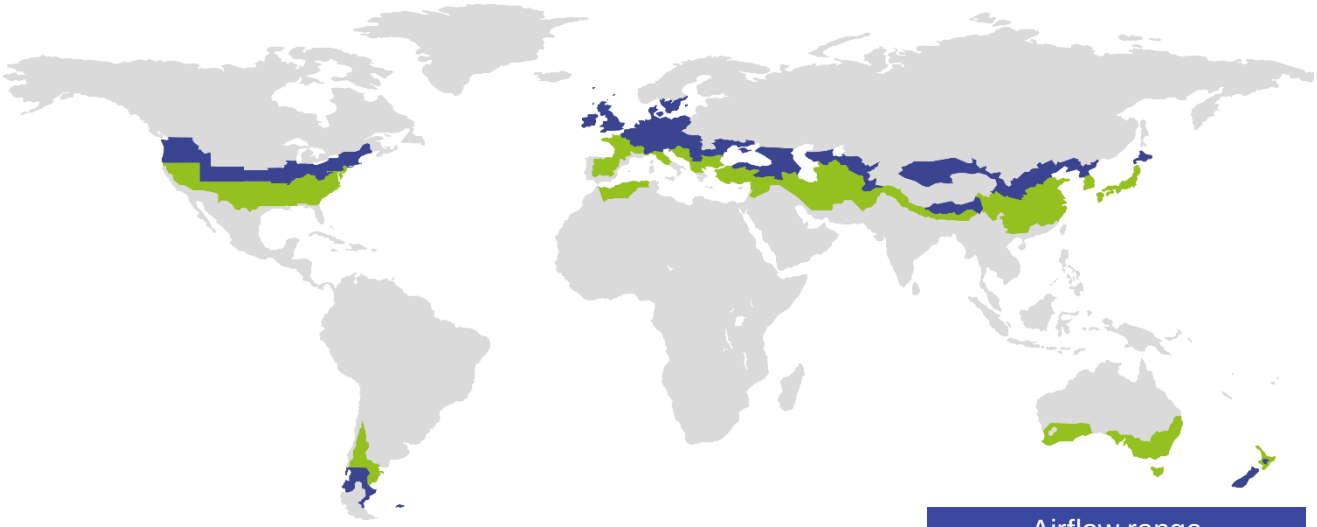

| | |
|---|---|
| Category: | **Air handling unit with heat recovery** |
| Manufacturer: | **J. PICHLER Gesellschaft m.b.H. Austria** |
| Product name: | **LG 1400 System VENTECH** |
| Specification: | Airflow rate > 600 m³/h |
| Heat exchanger: | Recuperative |

**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**

350-1100 m³/h
at an external pressure of
228 Pa [1)]
(Requirements non-residential buildings)

350-1200 m³/h
at an external pressure of
198 Pa [2)]
(Requirements residential buildings)

**Heat recovery rate**

$\eta_{HR}$ = 83 % (non-residential)
$\eta_{HR}$ = 82 % (residential)

**Specific electric power**

$P_{el,spec}$ = 0.39 Wh/m³ (non-residential)
$P_{el,spec}$ = 0.38 Wh/m³ (residential)

**Performance number**

10.8 (non-residential)
11.3 (residential)

cool, temperate climate

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[1)] The real available external pressure with installed filters for application in non-residential buildings makes **185 Pa**.

[2)] The real available external pressure with installed filters for application in non-residential buildings makes **153 Pa**.

Additional components, e.g. heating coils, decrease the available pressure difference accordingly.

### Passive House comfort criterion

A minimum supply air temperature of 16.5 °C is maintained at an external air temperature of -10 °C.

### 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.

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

With

| | |
|---|---|
| $\eta_{HR}$ | Heat recovery rate in % |
| $\theta_{ETA}$ | Extract air temperature in °C |
| $\theta_{EHA}$ | Exhaust air temperature in °C |
| $\theta_{ODA}$ | 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) |

| Heat recovery rate |
|---|
| $\eta_{HR}$ = 83 % (requirements for non-residential buildings) |
| $\eta_{HR}$ = 82 % (requirements for residential buildings) |

### Airflow range and external pressure difference

The operational range of the device results from the efficiency criterion (see below). As per the certification criteria for ventilation units > 600 m³/h the applicable pressure differences vary with the nominal range of operation (as declared by the producer) and the application (residential or non-residential building).

The external pressure difference includes all pressure losses of the ventilation system caused by components apart from the tested unit (consisting of casing, heat exchanger and fans). If filters are installed inside of the unit, their pressure losses are to be reduced accordingly. The average filter pressure drop of an operational filter is assumed to be 30 % higher than that of the clean filter.

- According to the certification requirements for non-residential buildings the airflow range achieves **350-1100 m³/h** at an external pressure difference of **228 Pa**. The available pressure difference with installed filters, internal electrical preheater and shut-off dampers is about **185 Pa**.
- According to the certification requirements for residential buildings the airflow range achieves **350-1200 m³/h** at an external pressure difference of **198 Pa**. The available pressure difference with installed filters, internal electrical preheater and shut-off dampers is about **153 Pa**.

**Efficiency criterion (electric power)**

The overall electrical power consumption of the device including controllers was measured at the test facility as per the requirements for non-residential buildings at an external pressure difference of 228 Pa and as per the requirements for residential buildings at 198 Pa.

| Specific electric power |
|---|
| $P_{el,spec}$ = 0.39 Wh/m³ (requirements for non-residential buildings) |
| $P_{el,spec}$ = 0.38 Wh/m³ (requirements for residential buildings) |

**Performance number**

Based on the measured values for the calculation of heat recovery efficiency and power consumption and on the climatic data of central Europe (Gt: 84 kKh, heating time: 5400 h/a), an average performance number at the airflow range was determined.

| Performance number |
|---|
| 10.8 (requirements for non-residential buildings) |
| 11.3 (requirements for residential buildings) |

**Leakage**

The airtightness of the unit is tested for under pressure and over pressure before the thermodynamic test is conducted. As per the certification criteria the leakage airflows must not exceed 3 % of the average airflow of the device's operating range.

| Internal leakage | External leakage | |
|---|---|---|
| 0.56 % | 0.39 % | (requirements for non-residential buildings) |
| 0.52 % | 0.36 % | (requirements for residential buildings) |

**Settings and airflow balance**

It must be possible to adjust the balance of airflows at the unit itself (either between the exhaust and the outdoor airflows or between the supply and the extract airflows, if the unit is respectively placed inside or outside of the insulated thermal envelope of the building). Availeable operation modes are explained in detail in the operation manual.

- Balancing of the airflow rates of the unit is possilbe.
  - ✓ The airflow volumes can be held steady automatically (by measurement of pressure differences at the fan inlet nozzle).
- The standby power consumption of this device makes 2.8 W.
- After a power failure, the device will automatically resume operation.

### Acoustical testing

A ventilation unit > 600 m³/h is assumed to be operated in an installation room, for which sound limits are defined in the applicable regulations. For this device, the following sound level values have been derived from the measurements at an airflow rate of **1100/1200 m³/h** (requirements for non-residential/residential buildings):

| Casing | Duct | | | |
|---|---|---|---|---|
| | Outdoor | Supply | Extract | Exhaust |
| 60.1 / 60.5 dB(A) | 60.2 / 61.4 dB(A) | 71.5 / 70.9 dB(A) | 62.3 / 60.4 dB(A) | 72.0 / 73.1 dB(A) |

- For complying with the required sound level in the supply air and extract air rooms, dimensioning of a suitable silencer is required for the specific project on the basis of the measured sound level.

### Indoor air quality

Instructions for changing of the air filters are documented in the operation manual. This device is equipped with following filter qualities:

| Outdoor air filter | Extract air filter |
|---|---|
| F7 | G4 |

If the device is not operated during summer, the filter should be replaced before the next operation. The producer of the device has to ensure that based on the latest findings, room air hygiene can be maintained by means of integrated or obligatory components.

For the operation of ventilation systems a strategy for avoiding permanent moisture penetration of the outdoor air filter needs to be considered. The strategies are mentioned in the full report and can be implemented through installation of either an additional component of the ventilation device or on the ventilation site system.

### Frost 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.

- Frost protection of the heat exchanger:
  - ✓ As per manufacturer information, several frost protection systems can be applied:
    - Preheating through the brine ground heat exchanger,
    - Bypassing the heat exchanger and post-heating of the supply air with a hydraulic heater coil,
    - Utilization of an electric pre-heater (comes optionally with the unit).

    All strategies are described in the test report.

- Frost protection of downstream hydraulic heater coils:
  - ✓ Also the hydraulic post-heating coil requires frost protection. If it is operated without antifreeze fluid a thermostat needs to be installed at the ventilation unit's supply air outlet. This signals any risk of frost to the device. At an activation of the thermostat the control of the ventilation device shuts off the fans, it opens the mixing valve of the heater coil shuts off the circulation pump.

  It should be noted that, due to free circulation, cold air can also lead to freezing – even when the fans are stationary. This can only be ruled out if the air duct is closed (by means of a shut-off flap).

**Bypass of the heat recovery**

A summer bypass of the heat recovery is part of this appliance. It is applicable for night ventilation strategies in order to dissipates heat. The fans cause a temperature raise of 2 K (at ODA 16 °C / EHA 24 °C). The effectiveness of the bypass for night cooling has been tested.