

# Certificate

## Certified Passive House Component

For cool, temperate climates, valid until 31 December 2018

Category: **Heat recovery unit**  
Manufacturer: **J. PICHLER Gesellschaft m.b.H.**  
**9021 Klagenfurt, Austria**  
Product name: **LG 1000**

**This certificate was awarded based on the following criteria:**

Thermal comfort	$\Theta_{\text{supply air}} \geq 16.5 \text{ °C}$ at $\theta_{\text{outdoor air}} = -10 \text{ °C}$
Effective heat recovery rate	$\eta_{\text{HR,eff}} \geq 75\%$
Electric power consumption	$P_{\text{el}} \leq 0.45 \text{ Wh/m}^3$
Performance number	$\geq 10$
Airtightness	Interior and exterior air leakage rates less than 3% of nominal air flow rate
Balancing and adjustability	Air flow balancing possible: yes Automated air flow balancing: yes
Sound insulation	It is assumed that large ventilation units are installed in a separate building services room. Sound levels documented in the appendix of this certificate
Indoor air quality	Outdoor air filter F7 Extract air filter G4
Frost protection	Frost protection required Different strategies mentioned in the appendix of this certificate

1) Available pressure difference with installed filter: **195 Pa**.

2) Available pressure difference with installed filter: **158 Pa**.

Additional components (e.g. heater coil) decrease the available pressure difference accordingly.

Further information can be found in the appendix of this certificate.

**Certified for air flow rates of 450 – 1200 m<sup>3</sup>/h**

At an external pressure of **233 Pa**<sup>1)</sup>  
(non residential)

**and 450 – 1000 m<sup>3</sup>/h**

At an external pressure of **187 Pa**<sup>2)</sup>  
(residential)

$\eta_{\text{HR,eff}}$  **82%**  
(non residential)

$\eta_{\text{WRG,eff}}$  **81%**  
(residential)

**Electric power consumption**

**0.40 Wh/m<sup>3</sup>**  
(non residential)

**0.33 Wh/m<sup>3</sup>**  
(residential)

**Performance number**

**11.2** (non residential)

**13.2** (residential)



**CERTIFIED COMPONENT**

Passive House Institute

## Appendix of the certificate J. PICHLER Gesellschaft m.b.H., LG 1000

**Manufacturer** J. PICHLER Gesellschaft m.b.H.  
Karlweg 5, 9021 Klagenfurt, Austria  
Tel: 0043 (0) 46332769  
E-Mail: office@pichlerluft.at, www.pichlerluft.at

### Passive House comfort criterion

A minimum supply air temperature of 16.5 °C at an external air temperature of -10 °C can be maintained if an adequate frost protection system is installed.

### Effective heat recovery rate

The effective dry heat recovery efficiency is measured at the test facility with balanced mass flows on the external air/extract air side. The boundary conditions for the measurement are defined in the testing procedure.

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

The (dry) ventilation heating load (building is the system boundary: Plus Infiltration) can be calculated:

$$Q_{Ventilatin,dry} = V \cdot (100\% - \eta_{HR,eff}) \cdot 0,34 \Delta \varrho$$

In case of condensation the heat recovery rate usually is higher. For the thermodynamic testing air conditions are chosen which exclude condensation. The heat recovery rate of this device amounts to:

$$\eta_{WRG,t,eff} = \mathbf{82\% \text{ (non-residential)}}$$

$$\eta_{WRG,t,eff} = \mathbf{81\% \text{ (residential)}}$$

### Air flow 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 m<sup>3</sup>/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 of the clean filter.

- According to the requirement of non-residential buildings with an air flow range of 450 – 1200 m<sup>3</sup>/h at an external pressure of 233 Pa the available pressure difference with installed filters is about **195 Pa**.
- According to the requirement of residential buildings with an air flow range of 450 – 1000m<sup>3</sup>/h at an external pressure of 187 Pa the available pressure difference with installed filters is about **158 Pa**.

### Efficiency criterion (power consumption)

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 233 Pa (residential buildings 187 Pa). The measurements lead to values of: **0.40 / 0.33 Wh/m<sup>3</sup>** (non-residential buildings / residential buildings)

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

- ✓ **Performance number: 11.2 / 13.2 (non-residential buildings / residential buildings)**

### Air tightness and insulation

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

Following leakage rates were measured:

**Internal leakage: 0.4 / 0.5 % (non-residential buildings / residential buildings)**

**External leakage: 0.6 / 0.7 % (non-residential buildings / residential buildings)**

This appliance meets the air tightness requirements

### Balancing and adjustability

The ventilation unit must provide the opportunity to adjust the balance between the exhaust and outdoor air flow (unit located inside of the thermal envelope) or the extract and supply air flow (unit located outside of the thermal envelope). Possible operation modes are explained in detail in the operation manual.

- Die Balance-Einstellung der Ventilatoren erfolgt
- Balancing the air flow rates of the unit is possible
  - ✓ the air flow rates are hold steady automatically (by measurement of pressure differences in extract- and supply air ducts)
- The standby consumption of this ventilation appliance is 7.5 W .In order to avoid unnecessary standby losses a manual switch for complete disconnection from supply should be installed.
- After a power failure the device automatically resets into its last operation mode.

### Sound Protection

A ventilation unit > 600 m<sup>3</sup>/h is assumed to be operated in an installation room, for which sound limits are defined in the applicable regulations. For this device following sound level values have been derived from the measurements at an air flow rate of **1213 / 1001 m<sup>3</sup>/h** (non-residential buildings / residential buildings):

Geräteschall [dB(A)]	Kanalschall AU [dB(A)]	Kanalschall ZU [dB(A)]	Kanalschall AB [dB(A)]	Kanalschall FO [dB(A)]
56.6 / 55.4	59.4 / 56.0	76.4 / 72.1	63.2 / 62.0	74.0 / 71.1

- In order to not exceed sound level limits silencers might be required and need to be dimensioned as per the project requirements and on basis of these sound levels.

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### Indoor air quality

This device is equipped with following filter qualities:

- ✓ Outdoor Air filter F7
- ✓ Extract Air filter 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 state of knowledge 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 need to be considered. The strategies are mentioned in the full report and can be implemented through installations of either additional component of the ventilation device or on the ventilation site system.

### Frost protection

Appropriate measures must be provided in order to avoid icing inside the heat exchanger and freezing of the hydraulic post-heater coil during winter at extreme temperatures (-15°C). The actual function of the ventilation device must not be impaired by the regular operation of the frost protection system. A sufficient air supply must be provided with balanced air flows. Infiltration due to excess extract air would cause an unacceptable heat load. For the frost protection of the hydraulic post-heater coil the failure of a pre-heater coil or the exhaust air fan needs to be considered.

- Frost protection circuit for the heat exchanger:
  - ✓ As per manufacturer information 2 frost protection systems can be applied. Either combination with a hydraulic preheater (optional) or an electrical preheater (optional) is possible. Both frost protection strategies are described in the certification report of Passive house Institute.
- Frost protection circuit for post heater coil:
  - ✓ In order to protect a downstream hydraulic supply air heater, an undershooting of +5°C supply air temperature leads to a shutdown of the unit.

Zu beachten ist, dass Kaltluft durch freie Zirkulation auch bei stehendem Ventilator zum Einfrieren führen kann, dies kann nur durch Verschließen der Luftleitung (durch Absperrklappe) ausgeschlossen werden.

### Bypass of the heat recovery

A controlled summer bypass is integrated in the system and suitable for free night cooling. Through this bypass a temperature raise of about 2 K was caused at the supply air side (Test condition: ODA 16.4 °C / ETA 24.1 °C).

**Abbreviations:** ODA = Outdoor air, EHA = Exhaust air, SUP = Supply air, ETA = Extract air