Certificate

Certified Passive House component

For cool, temperate climates, valid until 31 December 2018

Passive House Institute
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Category: **Heat recovery unit**

Manufacturer: **Lufttechnik J. Pichler GmbH**
9021 Klagenfurt, AUSTRIA

Product name: **LG 3200 System Ventech**

This certificate was awarded based on the following criteria:

Thermal comfort	$\Theta_{supply\ air} \geq 16.5$ °C at $\theta_{outdoor\ air} = -10$ °C
Effective heat recovery rate	$\eta_{HR,eff} \geq 75\%$
Electric power consumption	$P_{el} \leq 0.45$ Wh/m³
Performance number	≥ 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
Frostprotection	Frost protection required Different strategies mentioned in the appendix of this certificate

Certified for air flow rates of
950 – 1800 m³/h
At an external pressure of
259 Pa [1)]
(Requirements non residential buildings)

and
air flow rates of
600 - 1600 m³/h
At an external pressure of
216 Pa [2)]
(Requirements residential buildings)

$\eta_{HR,eff}$ 84%
(Requirements non residential buildings)

$\eta_{HR,eff}$ 82%
(Requirements residential buildings)

Electric power consumption
0.41 Wh/m³

Performance number
10.3

1) Available pressure difference with installed filter: **223 Pa**.
2) Available pressure difference with installed filter: **194 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 COMPONENT
Passive House Institute

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Passive House comfort criterion

A minimum supply air temperature of 16.5 °C at an external air temperature of -10 °C can only be maintained if an adequate frost protection system with pre or post heating coils is installed. The controller comes with corresponding algorithms.

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.

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

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

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

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:

$\eta_{HR,eff}$= 84% (non-residential)

$\eta_{HR,eff}$= 82% (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 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 of the clean filter.

- According to the requirements of non-residential buildings with an air flow range of 950 – 1800m³/h at an external pressure difference of 259 Pa. The available pressure difference with installed filters is about **217 Pa**
- According to the requirements of residential buildings with an air flow range of 950 - 2200 m³/h at an external pressure difference of 236 Pa. The available pressure difference with installed filters is about **194 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 and residential buildings at an external pressure difference of 259 / 236 Pa (non-residential / residential buildings). The measurements lead to an average value of **0.41 Wh/m³.**

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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 kKh, heating time: 5400 h/a), an average performance number at the air flow range was determined:

- ✓ **Performance number: 10.3**

Air tightness and insulation

Before starting the thermodynamic test, the air tightness test should be carried out for under pressure as well as for over pressure (according to the measurement requirements). The leakage air flows must not be greater than 3 % of the average air flow volume of the operating range of the ventilation device.

The following result was obtained for the device being tested:

Internal leakage: 0.9%

External leakage: 0.3%

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.Balancing the air flow rates of the unit:

- Balancing the air flow rates of the unit is possible
  - ✓ the air flow rates are hold steady automatically (by measurement of pressure differences at the fan's injections)
- This ventilation appliance has a very low standby consumption of 3 W.
- After a power failure the device automatically continues to operate in the mode that was set before the power failure.

Acoustic testing

For ventilation units > 600 m³/h an installation in a separate room for building services could be assumed, which is planned according to the valid regulation. Following sound levels have been determined at an air flow rate of 1800 / **2200 m³/h** (non-residential / residential buildings):

Sound level unit [dB(A)]	Sound level ODA [dB(A)]	Sound level SUP [dB(A)]	Sound level ETA [dB(A)]	Sound level EHA [dB(A)]
62.3 / 60.6	57.3 / 59.9	80.3 / 82.9	59.7 / 62.5	80.5 / 82.9

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

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Indoor air quality

Inspection and cleaning of the central device including the heat exchanger is simple. The filter can be replaced by the user himself/herself (no specialist required), relevant information should be provided and suppliers of filters should be listed in the manual. At least the following filter types should be provided for protection from pollutants:

- ✓ Outdoor Air filter at least F7
- ✓ Extract Air filter F5

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 should be taken to ensure prevention of icing over of the heat exchanger and freezing up of hydraulic post-heater coils during extreme winter temperatures (-15°C). The regular functioning of the device should be permanently ensured during uninterrupted operation of the frost protection circuit (there is no interrupt circuit for outdoor air in the Passive House, as the heating loads caused by the forced infiltration would become too high). If heater coils for hot water are used, a suitable frost protection circuit should ensure prevention of frost damage to these heater coils. In the process, the possibility of failure of the pre-heating coils and extract air fans must also be taken into consideration.

- Frost protection circuit for the heat exchanger:

  As per manufacturer information several frost protection systems can be applied: preheating through a 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 circuit for 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 cold air can also lead to freezing up if the fans stand still due to free circulation. This can be avoided by closing the air duct with shut-off flaps..

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 2K (at ODA 16°C / EHA 24°C). The effectiveness of the bypass for night cooling has been tested.

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