

# 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: **Vaventis B.V.**  
**1381 AV Weesp, NETHERLANDS**  
Product name: **fresh-r with second room connection**

**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	$P_{\text{el}} \leq 0.45 \text{ Wh/m}^3$
Airtightness	Interior and exterior air leakage rates of 3 % of nominal air flow rate met
Balancing and adjustability	Air flow balancing possible: yes Automated air flow balancing: yes
Sound insulation	Sound pressure level in living room $\leq 25 \text{ dB(A)}$
Indoor air quality	Outdoor air filter at least F7 Extract air filter at least G4
Frost protection	frost protection for the heat exchanger with continuous fresh air supply down to $\theta_{\text{outdoor air}} = -15 \text{ °C}$

- 1) The required sound pressure level in the installation room can be exceeded in demand operation mode.

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

**Certified for air flow rates of**

**20 - 30 m<sup>3</sup>/h**  
(continuous operation)

**20 - 65 m<sup>3</sup>/h<sup>1)</sup>**  
(on-demand operation)

$\eta_{\text{HR,eff}}$   
**78 %**

**Electric power consumption**  
**0.28 Wh/m<sup>3</sup>**



**CERTIFIED COMPONENT**

Passive House Institute

## Appendix to the certificate Vaventis B.V., fresh-r

**Manufacturer:** Vaventis B.V.  
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### Passive House comfort criterion

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

### Efficiency criterion (heat recovery rate)

The effective dry heat recovery rate is measured at the test facility using balanced mass flows on the outdoor air/extract air side. The boundary conditions for the measurement should be taken from the documents relating to the testing procedure.

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

The (dry) ventilation heating load (the house is the system boundary) can be calculated using  $\eta_{HR,eff}$  based on the formula  $V_{supply} \cdot (1 - \eta_{HR,eff}) \cdot 0.34 \cdot \Delta\vartheta$  (multiplied by the infiltration rate). The rates of heat recovery are usually greater if condensation occurs in the heat exchanger. Initially, this will not be taken into account on purpose.

For this device:

$$\eta_{HR,eff} = 78 \%$$

### Efficiency criterion (power consumption)

The unit was examined with the following conditions, which are according to a standard installation situation of the unit. Outdoor air and exhaust air free air intake and discharge, supply air with free air outlet, extract air with duct connection (Pressure difference 40 Pa).

For this device:

$$0.28 \text{ Wh/m}^3$$

### Air tightness and insulation

Before starting the thermodynamic test, the device was tested respecting internal and external leakages. 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 at an external pressure difference of 50 Pa:

**Internal leakage: 0.54 %**

**External leakage: 1.1 %**

## Appendix to the certificate Vaventis B.V., fresh-r

### Adjustability

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

- This unit is certified for air flow rates of 20 - 30 m<sup>3</sup>/h (continuous operation) or 20-65 m<sup>3</sup>/h (on-demand operation)
- Balancing the air flow rates of the unit is possible
  - ✓ The air flow rates are hold steady automatically
- The device being tested here has a standby power consumption of **3.8 W** and therefore does not comply with the target value of 1 W. The device should be equipped with an additional external switch to separate the device from the electric circuit if required.
- After a power failure the device automatically continues to operate in the mode that was set before the power failure. The unit should be equipped with an additional switch.

### Acoustical testing

Since it can be assumed that the unit will be installed in a living room the sound pressure level should be restricted to 25 db(A). The following sound levels for the unit with second room connection have been determined depending on the air flow rate.

Air flow rate [m <sup>3</sup> /h]	25	30	40	50	65	80
Sound level unit L <sub>w</sub> [dB(A)]	26	28	33	37	40	44
Sound pressure level at 10 m <sup>2</sup> room absorption area (eg. living room) L <sub>p</sub> [dB(A)]	22	24	29	33	38	42

The criteria for the sound pressure level (25 dB(A)) in the specific installation room with an equivalent room absorption area of 10 m<sup>2</sup> are met for the unit with second room connection up to an air flow rate of 30 m<sup>3</sup>/h (continuous operation).

### Indoor air hygiene

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). The unit is equipped with following filter qualities:

- ✓ Outdoor Air filter F7
- Extract Air filter -

For the installation in a Passive House the unit should be equipped with an Outdoor Air filter F7 (available as an accessory from manufacturer).

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

## Appendix to the certificate Vaventis B.V., fresh-r

### 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 (the interruption of the outdoor air flow is no adequate frost protection strategy for passive houses, as the heating loads caused by the forced infiltration would become too high).

- Frost protection circuit for the heat exchanger:

In order to prevent the heat exchanger from freezing even at low outdoor air temperatures, the manufacturer provides an external outdoor air heater to be installed in the short outdoor air duct. The preheater provides a maximum electric power output of about 600 W. The frost protection strategy is based on the incoming outdoor air temperature. The frost protection strategy has been tested: the preheater started operation not before the outdoor air temperature dropped below -4 °C. The average exhaust air temperature was 6 °C).

### Abbreviations

- AU/ODA = Outdoor air
- FO/EHA = Exhaust air
- ZU/SUP = Supply air
- AB/ ETA = Extract air