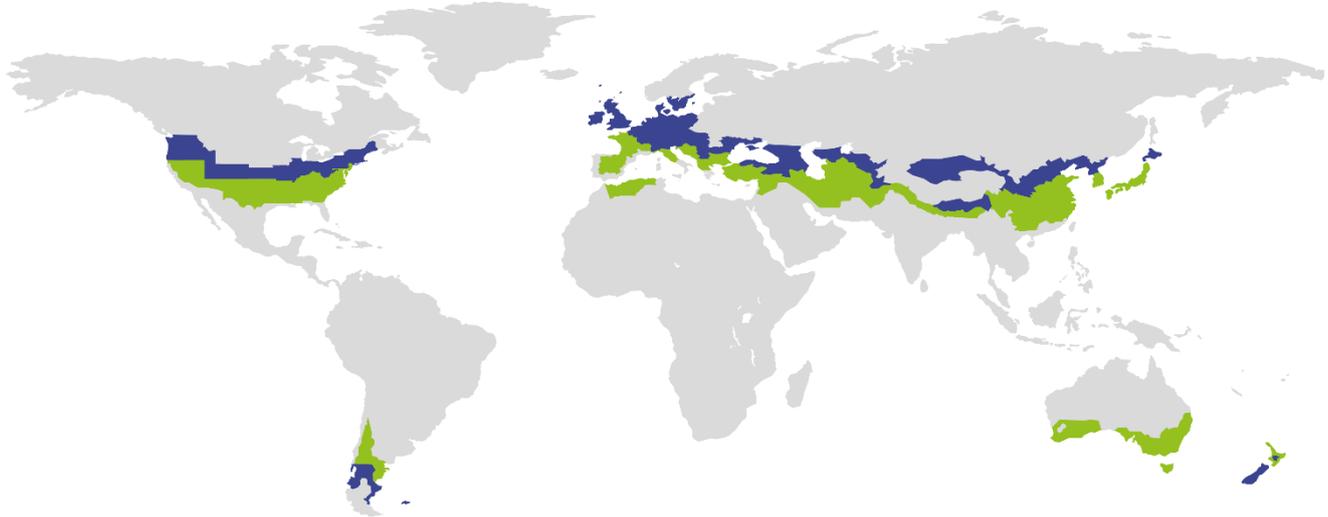


CERTIFICATE

Certified Passive House Component

Component-ID 0827s03 valid until 31st December 2019

Passive House Institute
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Category: **Air handling unit with heat recovery**
Manufacturer: **Vaventis B.V.**
Netherlands
Product name: **fresh-r**
Specification: Single room ventilation system with optional second room connection
Heat exchanger: Recuperative

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

Heat recovery rate $\eta_{HR} \geq 75 \%$
Specific electric power $P_{el,spec} \leq 0.45 \text{ Wh/m}^3$
Leakage $< 3 \%$
Comfort Supply air temperature $\geq 16.5 \text{ }^\circ\text{C}$ at outdoor air temperature of $-10 \text{ }^\circ\text{C}$

Airflow range

20-30 m³/h

(continuous operation)

20-65 m³/h

(on-demand operation for elimination of increased loads)

Heat recovery rate

$\eta_{HR} = 78 \%$

Specific electric power

$P_{el,spec} = 0.28 \text{ Wh/m}^3$

cool, temperate climate



**CERTIFIED
COMPONENT**

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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 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

- η_{HR} Heat recovery rate in %
- θ_{ETA} Extract air temperature in °C
- θ_{EHA} Exhaust air temperature in °C
- θ_{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

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

Efficiency criterion (electric power)

The unit was examined with the following conditions, which correspond to the standard installation situation of the unit: Free outdoor/exhaust air intake and exhaust, free supply air intake, extract air side equipped with a ducting for connection of second room according to the manufacturer recommendations. (pressure difference 40 Pa).

Specific electric power

$$P_{el,spec} = 0.28 \text{ Wh/m}^3$$

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
$\varepsilon_L = 0.66$

Leakage

The leakage airflow must not exceed 3 % of the average airflow of the unit's operating range. The result were obtained for the device being tested at an external pressure difference of 50 Pa.

Internal leakage	External leakage
0.54 %	1.10 %

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 unit is certified for airflow rates of 20-30 m³/h (continuous operation) resp. 20-65 m³/h (on-demand operation for elimination of increased loads).
- Balancing of the airflow rates of the unit is possible.
 - ✓ The airflow volumes can be held steady automatically.
- The standby power consumption of this device makes 3.8 W. The target value of 1 W was exceeded. The device should be equipped with an additional external switch so that it can be disconnected from the mains, if required.
- After a power failure, the device will automatically resume operation.

Acoustical testing

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 for the unit with second room connection have been determined depending on the airflow rate:

Airflow rate	Sound power level L_W	Sound pressure level L_p at 10 m ² of room absorption area (e.g. living room)
25 m ³ /h	26 dB(A)	22 dB(A)
30 m ³ /h	28 dB(A)	24 dB(A)
40 m ³ /h	33 dB(A)	29 dB(A)
50 m ³ /h	37 dB(A)	33 dB(A)
65 m ³ /h	40 dB(A)	38 dB(A)
80 m ³ /h	44 dB(A)	42 dB(A)

- The criteria for the sound pressure level (25 dB(A)) in the specific installation room with an equivalent room absorption area of 10 m² are met for the unit with second room connection up to an airflow rate of 30 m³/h (continuous operation).

Indoor air quality

This unit is equipped with following filter qualities by default:

Outdoor air filter	Extract air filter
F7	-

The unit is equipped with M5 filter on both extract and supply air side as default. For installation in passive houses, use of an outdoor air filter with efficiency of ISO ePM1 50% (F7 according to EN 779) or better is recommended (available as accessory part).

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

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.

- Frosts protection of 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).