

Certificate

Passive House suitable component

For cool, temperate climates, valid until 31 December 2015

Category: **Heat recovery unit**
Manufacturer: **Brink Climate Systems B.V.**
7951 –DA Staphorst, NETHERLANDS
Product name: **Renovent Excellent 400 (Plus)**

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 less than 3% of nominal air flow rate
Balancing and adjustability	Air flow balancing possible: yes Automated air flow balancing: yes
Sound insulation	Sound level $L_w \leq 35 \text{ dB(A)}$ not met Here $L_w = 51.5 \text{ dB(A)}$ Unit should be installed so that it is acoustically separated from living areas.
Indoor air quality	Outdoor air filter F7 Extract air filter G4
Frostprotection	Frost protection for the heat exchanger with continuous fresh air supply down to $\Theta_{\text{Outdoor air}} = -15 \text{ °C}$ ¹⁾

1) Only with additional anti freezing protection

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

Certified for air flow rates of

77 – 290 m³/h

$\eta_{\text{HR,eff}}$

84%

(88% bei 100 m³/h)

Electric power consumption

0.29 Wh/m³



CERTIFIED COMPONENT

Passive House Institute

Appendix to the certificate

Brink Climate Systems B.V., Renovent Excellent 400 (Plus)

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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.

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

The (dry) ventilation heating load (the house is the system boundary) can be calculated using $\eta_{HR,eff}$ based on the formula $\dot{V}_{supply_air} * (1 - \eta_{HR,eff}) * 0.34 * \Delta\vartheta$ (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:

$$\eta_{HR,eff} = 84 \%$$

($\eta_{HR,eff} = 88\%$ bei 100 m³/h)

Efficiency criterion (power consumption)

The overall electrical power consumption of the device including that for regulation, but without that for the frost protection heating, is tested at the test facility at an external pressure of 100Pa (50Pa for each of the pressure/intake sides).

For this device: **0.29 Wh/m³**

Air tightness and insulation

Before starting the thermodynamic test, the air tightness test should be carried out in accordance with the DIBt guidelines for under pressure as well as for over pressure. 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 according to DIBt guidelines:

Internal leakage: 0.65 %

External leakage: 1.07 %

This ventilation unit meets the air tightness requirements.

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Brink Climate Systems B.V., Renovent Excellent 400 (Plus)

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 **77 – 290 m³/h**
- Balancing the air flow rates of the unit is possible
 - ✓ The air flow rates are hold steady automatically (by constant flow fans)
- The users should have at least have following possibilities for adjustment:
 - ✓ Switching the system on and off
 - ✓ Synchronized adjustment of the supply air and extract air flow to basic ventilation (= 70-80 %), standard ventilation (= 100 %) and increased ventilation (= 130 %) with clear readability of the set status.
 - ✓ Depending on the demand, the user can choose between 3 operating levels that can be set manually at the control unit of the operating element.
- The device being tested here has a relatively low standby power consumption of **2.3 W**.
- After a power failure the device automatically continues to operate in the mode that was set before the power failure.

Acoustical testing

In order to restrict the sound pressure level in the installation room, the sound power level should be restricted to 35 dB(A). With an equivalent room absorption area of 4 m² the amounts of sound power level and sound pressure level are nearly the same (the exact value of the sound pressure level in the specific installation room can be calculated with the help of the sound protection tool (download on www.passivehouse.com)).

Installation instructions must be provided which describe how the sound level can be kept below 25 dB(A) in living areas and below 30 dB(A) in functional areas. The following sound power levels have been determined at an air flow rate of **290 m³/h**:

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)]
51.5	52.4	49.7	47.0	61.6

- The sound level of the unit exceeds the limit value of 35 dB(A). Therefore the unit should be installed so that it is acoustically separated from living areas.
- Silencers are recommended by the manufacturer for complying with the required sound level in the supply air and extract air rooms. Detailed information about these can be found in the full report. Dimensioning of a suitable silencer is required for the specific project on the basis of the measured sound intensity level.

Appendix to the certificate

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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 - It should be noted that this filter is not equipped in the default unit configuration. The default configuration utilises two G3 filters instead of an F7 and G4. The F7 filter is available as an accessory to the unit and is recommended in order to be passive house permissible.
- ✓ Extract Air Filter G4

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

Filter replacement is recommended after an interval of 6 months.

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:
 - ✓ The apparatus is equipped with an integrated, electrical pre-heating element. This component operates at a power of 1000 W. The integrated, electrical pre-heating element is appropriate for outdoor air temperatures of about -10°C. In order to fully utilise the full-range of the unit during cold winter months (down to -15°C), an additional, external pre-heating element is demanded. The manufacturer recommends either a correspondingly dimensioned subterranean heat-exchange system be utilised or a pre-heating element of the type MQS 511335 rev. A, which has an electrical power of 1000 W.
- Frost protection circuit for downstream hydraulic heater coils:
 - ✓ The unit makes no use of an integrated emergency shut-off for when the supply air temperature drops below approximately 5°C. In order to protect the downstream hydraulic heat register, the manufacturer recommends the usage of an external thermostat which has the ability disconnect the unit from the power supply.

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

Abbreviations

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