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: **Helios Ventilatoren GmbH & CO KG**
78056 VS-Schwenningen, GERMANY

Product name: **KWL EC 800S PRO**

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

1) Available pressure difference with installed filter: **179 Pa**. Additional components (e.g. heater coil) decrease the available pressure difference accordingly.

Certified for air flow rates of 290 - 620 m³/h

At an external pressure of **195 Pa** [1)]

Requirements non residential buildings (Therewith device also applicable for residential building)

$\eta_{HR,eff}$ 80%

Electric power consumption 0.42 Wh/m³

Performance number 10.0

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

CERTIFIED COMPONENT
Passive House Institute

Appendix of the certificate Helios Ventilatoren GmbH & CO KG, KWL EC 800S PRO

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Passive House comfort criterion
A minimum supply air temperature of 16.5 °C is maintained at an external air temperature of -10 °C.

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:

$\eta_{HR,eff}$= 80%

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.

- This device was tested according to the requirements of non-residential buildings with an air flow range of 290 - 620 m³/h at an external pressure difference of 195 Pa. The available pressure difference with installed filters is about **179 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 195 Pa. The measurements lead to values of:

0.42 Wh/m³ (average value)

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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: 10.0**

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: 1.9%

External leakage: 1.1%

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 is possible
- The standby consumption of this ventilation appliance is 14 W. In order to avoid unnecessary standby losses the device should be complete disconnected from supply through his main switch.
- After a power failure the device automatically continues to operate in the mode that was set before the power failure.

Acoustic testing

A ventilation unit > 600 m³/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 **620 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)]
63	61	71	61	71

- 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 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 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:
  - ✓ The device is equipped with an electrical pre-heater with a heating power of 2.5 kW. Outdoor and exhaust air temperatures are measured to control the frost protection. Through measurement it was verified, that this frost protection is suitable for protecting the heat exchanger from freezing.

- Frost Frost protection circuit for post heater coil:
  - ✓ As described in the technical manual this appliance shuts down both the fans if the supply temperature drops below +5°C behind the heater coil. An error code will be displayed at the control element.

  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).

Bypass of the heat recovery

A summer bypass of the heat recovery is part of this appliance. It is controlled automatically.

The effectiveness of this appliance's bypass for night cooling of buildings has not been tested within the scope of this testing.

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