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 Villingen Schwenningen,
GERMANY

Product name: **KWL EC 1200S PRO**

Certified for air flow rates of 400 – 890 m³/h

At an external pressure of **215 Pa** [1)]

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

$\eta_{HR,eff}$ 81%

Electric power consumption 0.43 Wh/m³

Performance number 10

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: **183 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 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:

$\eta_{HR,eff}$= 81%

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 400 – 890 m³/h at an external pressure difference of 215 Pa. The available pressure difference with installed filters is about **183 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 215 Pa. The measurements lead to values of:

0.43 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**

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: 0.8%

External leakage: 0.4%

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 air flow rates are hold steady automatically (by measurement of pressure differences at the fan's injections)
- The standby consumption of this ventilation appliance is 16 W. In order to avoid unnecessary standby losses a manual switch for complete disconnection from supply should be installed.
- According to manufacturer's information 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 **1200 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)]
67.7	62.1	76.7	62.6	76.3

- 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 M5

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 manufacturer has included an internal, electric pre-heater in the ventilation unit. This pre-heater has a power of 5.7 kW and is appropriate for use in the frost-protection strategy of the unit. The said strategy is outdoor and exhaust air regulated. For ventilation units with an airflow range greater than 600 m³/h, the Passive House Institute recommends the selection of an energetically frugal frost protection strategy (e.g. hydraulic post-heater with frost protection circuit).
- Frost protection circuit for post heater coil:
  - ✓ This appliance shuts down both the fans if the supply temperature drops below +5°C behind the heater coil.

  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