Certificate

Certified Passive House component

For cool, temperate climates, valid until 31 December 2018

Passive House Institute
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GERMANY

Category: **Heat recovery unit**

Manufacturer: **Drexel und Weiss GmbH**
6960 WOLFURT, AUSTRIA

Product name: **Aerosilent Centro 1200**

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 for the heat exchanger with continuous fresh air supply down to $\Theta_{Outdoor\ air} = -15$ °C

1) Available pressure difference with installed filter: **181 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 for air flow rates of 660 – 1230 m³/h At an external pressure of 235 Pa [1)]
(Requirements non residential buildings)

$\eta_{HR,eff}$ 83%

Electric power consumption 0.45 Wh/m³

Performance number 10

CERTIFIED COMPONENT
Passive House Institute

Appendix of the certificate Drexel und Weiss GmbH, Aerosilent Centro 1200

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Passive House comfort criterion

A minimum supply air temperature of 16.5 °C at an external air temperature of -10 °C can only be maintained if an adequate frost protection system with pre or post heating coils is installed. The controller comes with corresponding algorithms.

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.

$$\eta_{WRG,t,eff} = \frac{(\vartheta_{Ab} - \vartheta_{Fo}) + \frac{P_{el}}{m \cdot c_p}}{(\vartheta_{Ab} - \vartheta_{Au})}$$

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:

$\eta_{WRG,t,eff}$ = 83%

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 requirement of non-residential buildings with an air flow range of 660 – 1230 m³/h at an external pressure difference of 235 Pa. The available pressure difference with installed filters is about **181 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 235 Pa The measurements lead to a value of:

0.45 Wh/m³

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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: 2.9%

External leakage: 1.2%

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 **11.1 W**. In order to avoid unnecessary standby losses a manual switch for complete disconnection from supply should be installed.
- After a power failure the device automatically resets into its last operation mode.

Sound Protection

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 **1298 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)]
63.4	69.3	57.9	60.2	74.4

- 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

Inspection and cleaning of the central device including the heat exchanger is simple. The filter can be replaced by the user (no specialist required), relevant information should be provided and suppliers of filters should be listed in the manual. At least the following filter types should be provided for protection from pollutants:

- ✓ Outdoor Air filter at least F7
- ✓ Extract Air filter at least G4

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:
  - ✓ As per manufacturer information several frost protection systems can be applied. Depending on the operation mode three frost protection strategies are recommended and requirements for the application are defined. It is possible to use ground source heat or a conventional heating system. The frost protection strategies are explained in detail in the certification report.

- Frost protection circuit for post heater coil
  - ✓ At the time of testing the unit did not include a system to shut down the supply air fan in order to protect the post heater coil (SUP temperature < 5°C). The rotation speed of the ODA / EHA air fan is measured. Therefore the required information is available to ensure the fans are switched off and the control can be adapted by the user. It is desirable that the unit would come with a prepared control. It should at least be described in the user manual how to set up the control.

  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 controlled summer bypass is integrated in the system. The suitability for free night cooling was not analysed within the scope of these tests.

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