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: **ALDES Aéraulique**
69694 Venissieux, FRANCE

Product name: **VEX550**

This certificate was awarded based on the following criteria:

Thermal comfort	$\theta_{supply\ air} \geq 16.5$ °C[1)] 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
Frost protection	Frost protection required Different strategies mentioned in the appendix of this certificate

1) Achieved by using of an electrical post heater on the supply air stream.
2) The recommended value of 10.0 was not achieved. As some additional components were installed in the unit, the total external pressure during the testing was higher than is recommended by the Certification criteria.

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

Certified for air flow rates of 1520-1690 m³/h
At an external pressure of **255 Pa**
Requirements non residential buildings (Therewith device also applicable for residential building)

$\eta_{HR,eff}$ 81%

Electric power consumption 0.45 Wh/m³

Performance number 9.2[2)]

CERTIFIED COMPONENT
Passive House Institute

Appendix of the certificate ALDES Aéraulique, VEX550

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Passive House comfort criterion

As the frost protection strategy is based on a proportionally controlled bypass between outdoor and supply air, post-heating of supply air is recommended. It can be realised through an internal or external post-heater.

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 that of the clean filter.

- According to the certification requirements for non-residential buildings the air flow range achieves 1520-1690 m³/h at an external pressure difference of **255 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 255 Pa. The measurements lead to values 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 central Europe (Gt: 84 kKh, heating time: 5400 h/a), an average performance number at the air flow range was determined:

- ✓ **Performance number: 9.2**

Notice: The recommended value of 10.0 was not achieved. As some additional components were installed in the unit, the total external pressure difference during the testing was higher than is recommended by the Certification criteria.

Airtightness and insulation

The airtightness 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: 3.0 %

External leakage: 2.8 %

This appliance meets the airtightness 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 volumes can be held steady automatically (by measurement of pressure differences at the fan's inlet cone).
- The standby consumption of this ventilation appliance of 10.0 W is regarded as high. In order to avoid unnecessary standby losses, a manual switch for complete disconnection from the power supply should be installed.
- 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, the following sound level values have been derived from the measurements at an air flow rate of **1634 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)]
56.1	54.1	68.5	54.2	69.1

- For complying with the required sound level in the supply air and extract air rooms, dimensioning of a suitable silencer is required for the specific project on the basis of the measured sound level.

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Indoor air quality

This device is equipped with following filter qualities:

- ✓ Outdoor Air filter F7
- ✓ Extract Air filter 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 findings, 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 needs to be considered. The strategies are mentioned in the full report and can be implemented through installation of either an 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, in order to protect the heat exchanger from freezing, the unit is equipped with a proportionally controlled bypass between outdoor and supply air. This bypass is controlled according to the exhaust air temperature. As default, the switch temperature is set to 5 °C (configurable value). Post heating of supply air is recommended in order to ensure comfortable supply air temperature. The manufacturer therefore offers an additional installation of electric or hydraulic supply air post heater.

    As another variant of a frost protection strategy the manufacturer recommends a combination of proportional bypass together with a preheater on the extract air stream. From an energy efficiency point of view, the use of the first mentioned frost protection strategy with a post heater on the supply air stream is preferable.
- Frost protection circuit for the post heater coil:
  - ✓ According to manufacturer information, both fans will be turned off in the case that the supply air temperature drops below to 5 °C.

  It should be noted that cold air can also lead to freezing 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

An automatically controlled summer bypass of the heat exchanger is part of this device.

The effectiveness of bypass for night cooling of buildings has not been investigated within the scope of this testing.

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