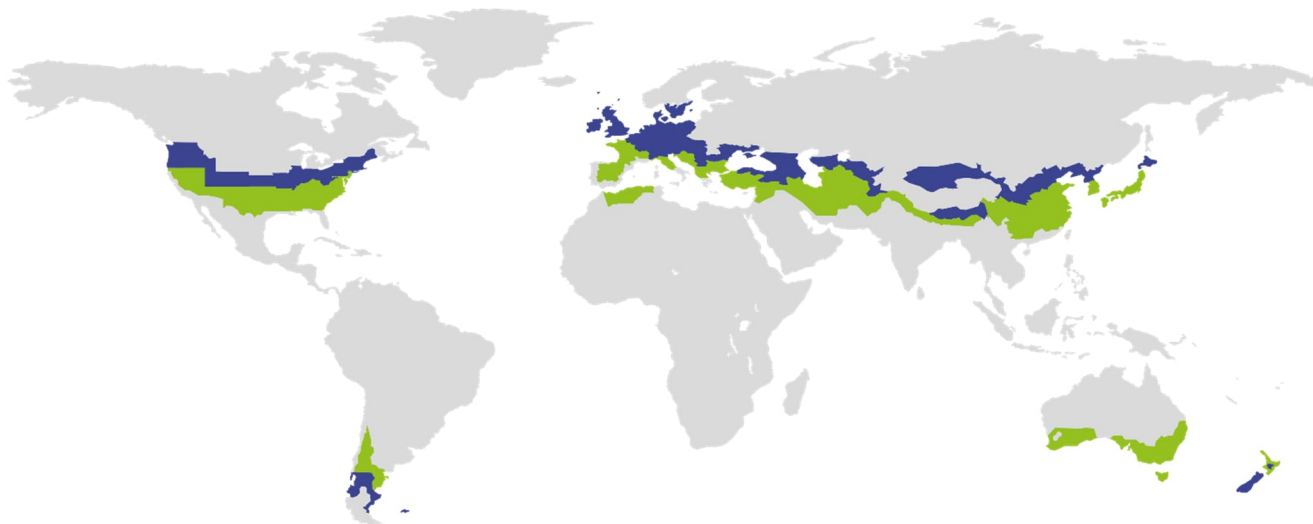


CERTIFICATE

Certified Passive House Component

Valid until 31st December 2025

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category: **Air handling unit with heat recovery**
Manufacturer: **Vent-Axia**
United Kingdom
Product name: **Ventilation unit series**
Sentinel Apex HR

Specification: Airflow rate > 600 m³/h
Heat exchanger: Recuperative

This certificate was awarded based on the product meeting the following main criteria

Heat recovery rate	η_{HR}	\geq	75 %
Specific electric power	$P_{el,spec}$	\leq	0.45 Wh/m ³
Leakage		$<$	3 %
Performance number		\geq	10
Comfort			Supply air temperature ≥ 16.5 °C at outdoor air temperature of -10 °C ²⁾

Airflow range
140 – 2140 m ³ /h at an external pressure of 210 - 298 Pa ¹⁾
Heat recovery rate
$\eta_{HR} \geq 80$ %
Specific electric power
$P_{el,spec} \leq 0.36$ Wh/m ³
Performance number
≥ 11.5

¹⁾ The pressure drop of filters is covered in the listed external pressure. Additional components decrease the available pressure difference accordingly

²⁾ With active frost protection strategy.

cool, temperate climate



**CERTIFIED
COMPONENT**

Passive House Institute

Vent-Axia

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Component ID	Unit model	Airflow range		External pressure Pa	Actual available external pressure ¹⁾ Pa	Specific electric power Wh/m ³	Specific electric power W/(l,s)	Heat recovery rate %	Performance number -
		Min m ³ /h	Max m ³ /h						
2478vI03	Sentinel Apex HR 06	140	720	269	202	0.36	1.3	80	11.5
2479vI03	Sentinel Apex HR 10	230	830	210	177	0.33	1.19	81	12.7
2480vI03	Sentinel Apex HR 15	430	1750	257	182	0.35	1.26	80	11.8
2481vI03	Sentinel Apex HR 21	530	2140	298	233	0.35	1.26	82	12

Table 1: Certified values for each unit model. ¹⁾ Pressure drop of filters were taken into account.

Passive House comfort criterion

At an outdoor air temperature of - 10 °C comfort supply air temperatures can be achieved by use of the provided internal electric frost protection strategy.

Efficiency criterion (heat recovery rate)

The effective heat recovery rate is measured at a test facility using balanced mass flows of the outdoor and exhaust air. The boundary conditions for the measurement are documented in the testing procedure.

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

With

- η_{HR} Heat recovery rate in %
- θ_{ETA} Extract air temperature in °C
- θ_{EHA} Exhaust air temperature in °C
- θ_{ODA} Outdoor air temperature in °C
- P_{el} Electric power in W
- \dot{m} Mass flow in kg/h
- c_p Specific heat capacity in Wh/(kg.K)

- The heat recovery rates for each model of the unit are listed in Table 1.

Airflow 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).

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.

- The airflow ranges and available external pressures for each model of the unit are listed in Table 1.

Efficiency criterion (electric power)

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 210 - 298 Pa.

- The specific electric powers for each model of the unit are listed in Table 1.

Performance number

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 kWh, heating time: 5400 h/a), an average performance number at the airflow range was determined.

- The performance numbers for each model of the unit are listed in Table 1.

Leakage

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 airflows must not exceed 3 % of the average airflow of the device's operating range.

- These appliances meet the airtightness requirements.

Settings and airflow balance

It must be possible to adjust the balance of airflows at the unit itself (either between the exhaust and the outdoor airflows or between the supply and the extract airflows, if the unit is respectively placed inside or outside of the insulated thermal envelope of the building). Available operation modes are explained in detail in the operation manual.

- Balancing of the airflow rates of the unit is possible.
- Once the fans have been adjusted and balanced, the air flows are maintained constant automatically.
- The standby power consumption of these devices can reach 10 W.
- After a power failure, the device will, according to manufacturer information, automatically resume operation.

Acoustical 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. The total acoustic power levels were determined by the producer for each model of the units at an upper limit of the airflow range. The data provided have been validated using measurements on individual devices as examples.

Unit model	Airflow range		Total acoustic power level				
	Min m³/h	Max m³/h	Casing dB(A)	Duct			
				ODA dB(A)	SUP dB(A)	ETA dB(A)	EHA dB(A)
Sentinel Apex HR 06	140	720	52	69	61	70	62
Sentinel Apex HR 10	230	830	50	66	59	67	60
Sentinel Apex HR 15	430	1750	61	73	68	74	65
Sentinel Apex HR 21	530	2140	52	67	62	67	62

Table 2: Acoustic power levels at the upper limit of the airflow range.

- 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.

Indoor air quality

Instructions for changing of the air filters are documented in the operation manual. This device is equipped with following filter qualities:

Outdoor air filter	Extract air filter
ISO ePM1 55%	ISO ePM10 50%

If the device is not operated during summer, the filter should be replaced before the next operation. 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 should be taken to prevent the heat exchanger and optional downstream hydraulic heater coil from getting damaged by frost during extreme winter temperatures (-15°C). It must be ensured that the unit's ventilation performance is not affected during frost protection cycles.

- Frost protection of the heat exchanger:
 - ✓ In order to protect the heat exchanger from freezing, a respectively dimensioned electric preheating coil is provided for each device.
- Frost protection of downstream hydraulic heater coils:
 - ✓ In order to protect a downstream hydraulic heater coil, the device is switched off in case the supply air temperature drops below 5°C .

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

Bypass of the heat recovery

The units are equipped with a summer bypass, which is operated automatically according to the outdoor and extract air temperature. The effectiveness of bypass for night cooling of buildings has not been investigated within the scope of this testing.