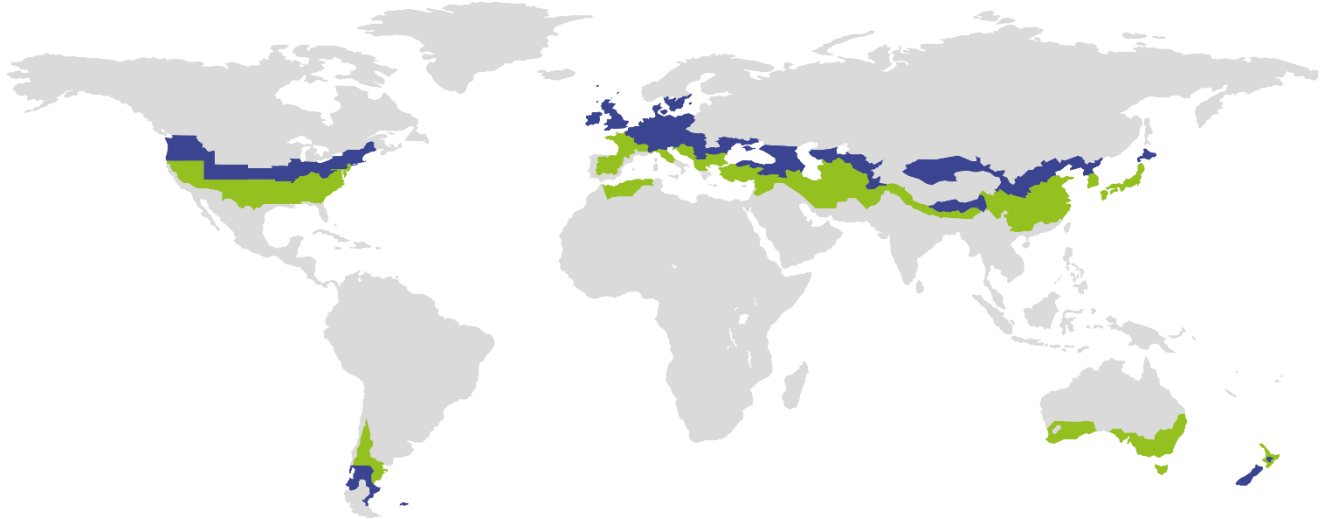


CERTIFICATE

Certified Passive House Component

Component-ID 1748vs03 valid until 31st December 2025

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Category: **Air handling unit with heat recovery**
Manufacturer: **Airmaster A/S**
Denmark
Product name: **Airmaster AM 1000**
(HH BB, HH TT, VV BB, VV TT)
Specification: Decentralised school room ventilation system
Heat exchanger: Recuperative

Airflow range
264-962 m ³ /h
Heat recovery rate
$\eta_{HR} = 75 \%$
Specific electric power
$P_{el,spec} = 0.24 \text{ Wh/m}^3$

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

Heat recovery rate $\eta_{HR} \geq 75 \%$
Specific electric power $P_{el,spec} \leq 0.45 \text{ Wh/m}^3$
Leakage $< 3 \%$
Comfort Supply air temperature $\geq 16.5 \text{ }^\circ\text{C}$
at outdoor air temperature of $-10 \text{ }^\circ\text{C}$



Passive House comfort criterion

At an outdoor air temperature of – 10 °C a supply air temperature higher than 16.5 °C is achieved by use of an optional internal electric preheater with a minimum power of 2300 W together with an optional internal electric post-heater with a power of 1500 W. The criterion is therefore met.

The measurements in the occupied area have proven that no air draught is to be expected, due to the distribution of the supply air (draught risk < 10 %). The installation recommendations of the manufacturer must be followed. (Exposed occupied area: horizontal distance from the ventilation unit up to 6 m, measuring height: 1.7 m).

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)

Heat recovery rate

$$\eta_{HR} = 75 \%$$

Efficiency criterion (electric power)

The unit was examined with the following conditions, which correspond to the standard installation situation of the unit: Free outdoor/exhaust air intake and exhaust, sound silencer on supply/extract air side installed, free supply/extract air intake and exhaust after the silencer.

Specific electric power

$$P_{el,spec} = 0.24 \text{ Wh/m}^3$$

Efficiency ratio

The efficiency ratio provides information about the overall energy performance of the respective ventilation unit. It specifies the achieved reduction in ventilation heat losses by using a ventilation unit with heat recovery rather than without.

Efficiency ratio
$\varepsilon_L = 0.58$

Leakage

The leakage airflow must not exceed 3 % of the average airflow of the unit's operating range.

Internal leakage	External leakage
1.19 %	2.06 %

Settings and airflow balance

It must be possible to adjust the balance between the exhaust airflow rate and the outdoor airflow rate for all units.

- This unit is certified for airflow rates of 264-962 m³/h.
- Balancing of the airflow rates of the unit is possible.
 - ✓ The airflow volumes can be held steady automatically (by measurement of pressure differences inside of the unit).
- The users should have at least following possibilities for adjustment:
 - ✓ Switching the system on and off
 - ✓ Synchronized adjustment of the supply air and extract airflow to basic ventilation (70-80 %), standard ventilation (100 %) and increased ventilation (130 %) with a clear indication of the current setting.
- The standby power consumption of this device makes 9.6 W. The target value of 1 W was exceeded. The device should be equipped with an additional external switch so that it can be disconnected from the mains, if required.
- After a power failure, the device will automatically resume operation.

Acoustical testing

Since it can be assumed that the unit will be installed in a classroom or meeting room, the sound pressure level in installation room should be restricted to 30 dB(A). The sound pressure level has been determined for a reference room with a volume of 200 m³ and a reverberation time of 0.7 s.

Airflow rate	Sound power level L_W	A-weighted sound power level L_{WA}
962 m ³ /h	53.9 dB	39.8 dB(A)

- The limiting sound pressure level value of 30 dB(A) was complied with in a reference room at the upper limit of the airflow range of 962 m³/h (room absorption area ca. 46 m²).

Indoor air quality

This unit is to be equipped with following filter qualities:

Outdoor air filter	Extract air filter
ISO ePM1 50%	ISO Coarse 60%

On the outdoor air side, the filter efficiency of ISO ePM1 50% (F7 according to EN 779) or better is recommended. For the extract air side, a filter efficiency of at least ISO Coarse 60% (G4 according to EN 779) is recommended. If not in standard configuration, the recommended filter is available as an accessory part.

Frosts 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 ($-15\text{ }^{\circ}\text{C}$). It must be ensured that the unit's ventilation performance is not affected during frost protection cycles.

- Frosts protection of the heat exchanger:
 - ✓ The basic frost protection strategy is based on disbalance between supply and extract air streams.
 - ✓ Installation of an optional preheater is recommended in order to protect the heat exchanger from freezing up when keeping the air streams balanced. The allowed disbalance should be set to "0 %".
 - ✓ Based on the laboratory measurement it is recommended to use an optional electric preheater with a heating power of at least 3000 W in order to protect the heat exchanger from freezing up at balanced operation at an upper airflow rate and an outdoor air temperature of $-15\text{ }^{\circ}\text{C}$.
- Frost protection of downstream hydraulic heater coils:
 - ✓ The ventilation unit is switched off if the parameter "hydraulic heater" is activated and the outdoor air temperature drops below a predefined limit temperature.