

Certificate

Passive House Suitable Component

For cool temperate climates, valid until 31. December 2019

Category: **Compact Heat Pump System**
 Manufacturer: **Drexel & Weiss**
6922 Wolfurt, AUSTRIA
 Product name: **aerosmart m**

This certificate was awarded based on the following criteria (limit values*):

Thermal Comfort: $\theta_{\text{supply air}} \geq 16,5^{\circ}\text{C}$
 Heat Recovery of ventilation system: $\eta_{\text{WRG,eff}} \geq 75\%$
 Electric efficiency ventilation system: $P_{\text{el}} \leq 0,45 \text{ Wh/m}^3$
 Air tightness (internal/external): $V_{\text{Leakage}} \leq 3\%$
 Total Primary Energy Ddemand (**): $PE_{\text{total}} \leq 55 \text{ kWh}/(\text{m}^2\text{a})$
 Control and calibration (*)
 Air pollution filters (*)
 Anti freezing strategy (*)
 Noise emission and reduction (*)

Measured values to be used in PHPP
useful air flow rates 137 to 204 m³/h

Heating

		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	-2	2	7		°C
Thermal Output Heating Heat Pump	$P_{\text{WP,Heiz}}$	1.03	1.18	1.34		kW
COP number Heating Heat Pump	COP_{Heiz}	2.22	2.73	3.07		-
Maximum available supply air temperature with Heat Pump only(*)		33				°C

Hot water

		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	-2	2	7	20	°C
Thermal Output Heat Pump for heating up storage tank.	$P_{\text{DHW heating up}}$	0.92	1.13	1.28	1.49	kW
Thermal Output Heat Pump for reheating storage tank	$P_{\text{DHW reheating}}$	0.88	1.10	1.28	1.41	kW
COP Heat Pump for heating up storage tank	$\text{COP}_{\text{DHW, heating up}}$	2.51	2.93	3.26	3.47	-
COP Heat Pump for reheating storage tank	$\text{COP}_{\text{DHW reheating}}$	2.08	2.39	2.71	2.71	-
Average storage tank temperature		47.1				°C
Specific storage heat losses		1.60				W/K
Exhaust air addition (if applicable)						m ³ /h

(*) detailed description of criteria and key values see attachment.

(**) for heating, domestic hot water (DHW), ventilation, auxiliary electricity in the reference building, explanation see attachment.

Heat Recovery

$$\eta_{\text{WRG,eff}} = 78\%$$

Electric efficiency

$$0.29 \text{ Wh/m}^3$$

Air tightness

$$V_{\text{leak, internal}} = 2.3\%$$

$$V_{\text{leak, external}} = 1.2\%$$

Frost protection

down to -3 °C

Total Primary Energy Demand (**)

47.8 kWh/(m²a)



CERTIFIED COMPONENT

Passive House Institute

Attachment to the Certificate(***) Drexel&Weiss, aerosmart m

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Passive House Thermal Comfort Criterion: A minimum supply air temperature of 16.5 °C is reached if the air first passes through earth tubes, i.e. the intake air of the ventilation system must have a temperature of at least -3 °C.

Efficiency Criterion – heat : The heat recovery of the ventilation system incorporated in the unit demonstrates an efficiency of $\eta_{\text{eff}} = 78 \%$.

Efficiency Criterion – electricity: With a power consumption of 0.29 Wh/m³ at an air flow rate of 173 m³/h, the unit complies with the maximum consumption of 0.45 Wh/m³. The consumption of 6.8 W in standby-mode exceeds the target value of 1 W. When the unit is not in use it should be completely detached from the power supply in order to avoid unnecessary standby losses.

Air tightness and thermal insulation: Testing the ventilation system showed that the limiting values of 3% for both the internal and external leakages were not exceeded.

Control und calibration: The unit automatically calibrates the air flow, this process cannot be influenced by the user. The required air flow rate can be set manually at the unit's console. The remote control has a 'party' button, which can be used to increase the air flow rate for a preset period of time.

Sound insulation: The acoustic pressure level was evaluated as 46 dB(A) in the room where the unit is installed with an equivalent absorption area of 4 m² and at an air flow rate of 200 m³/h. This is significantly higher than the threshold value of 35 dB(A), the unit must therefore be installed in an adequately sound insulated room separate from the living area.

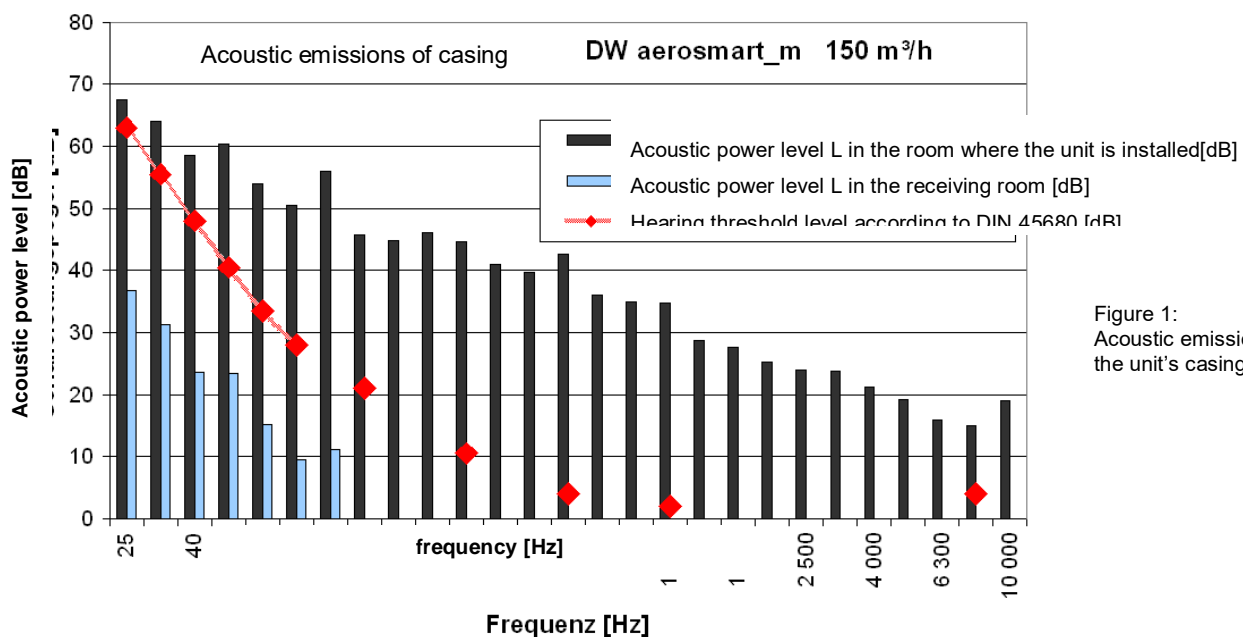


Figure 1:
Acoustic emissions of the unit's casing

Attachment to the Certificate(***) Drexel & Weiss, aerosmart m

Air pollution: The central ventilation unit, including the heat exchanger, can be easily accessed and cleaned. The filters can be replaced by the user (rather than by a technical expert), instructions and suppliers are included in the manual. The following filter qualities should be used: intake air filter minimum F7, attached in front, exhaust air filter G4. The filter should be replaced, before recommissioning the unit after a summer period when it has not been in use. The manufacturer carries the responsibility to ensure that, through the use of either integral components or mandatory additional fittings, the hygienic quality of the air is sufficiently high. G4 filters are installed in both the intake and exhaust air streams within the unit. The manufacturer recommends the installation of a separate fine particle filter (F7) at the intake of the required earth-to-air heat exchanger. This configuration is in accordance with the recommendations for Passive Houses.

Frost protection: The **anti-freeze protection** of this device is implemented externally. The manufacturer recommends the use of an external **ground-coupled heat exchanger** (based on air or on water) in order to pre-heat the intake air to at least $-3\text{ }^{\circ}\text{C}$. A minimum supply air temperature of $16.5\text{ }^{\circ}\text{C}$ is reached with a ground-coupled heat exchanger, i.e. the intake air of the device must have a temperature of at least $-3\text{ }^{\circ}\text{C}$.

Assessment of the heat pump: The seasonal performance factor for the reference building is 2.1. The primary energy consumption for the reference building is $47.8\text{ kWh}/(\text{m}^2\text{a})$. This compact heat pump unit can be used in Passive Houses with an energy reference area of 162 m^2 to 242 m^2 , based on a typical occupancy of $35\text{ m}^2/\text{person}$, an air flow rate of $30\text{ m}^3/\text{h}/\text{person}$ and a heating load of $12\text{ W}/\text{m}^2$. The unit was tested in combination with a specially selected **hot water storage**. If an other hot water storage is used the certified key values of the heat pump system especially the COP-values, the useful range of application and thus the seasonal performance factor (SPF) may differ significantly from the values denoted in the certification sheet.

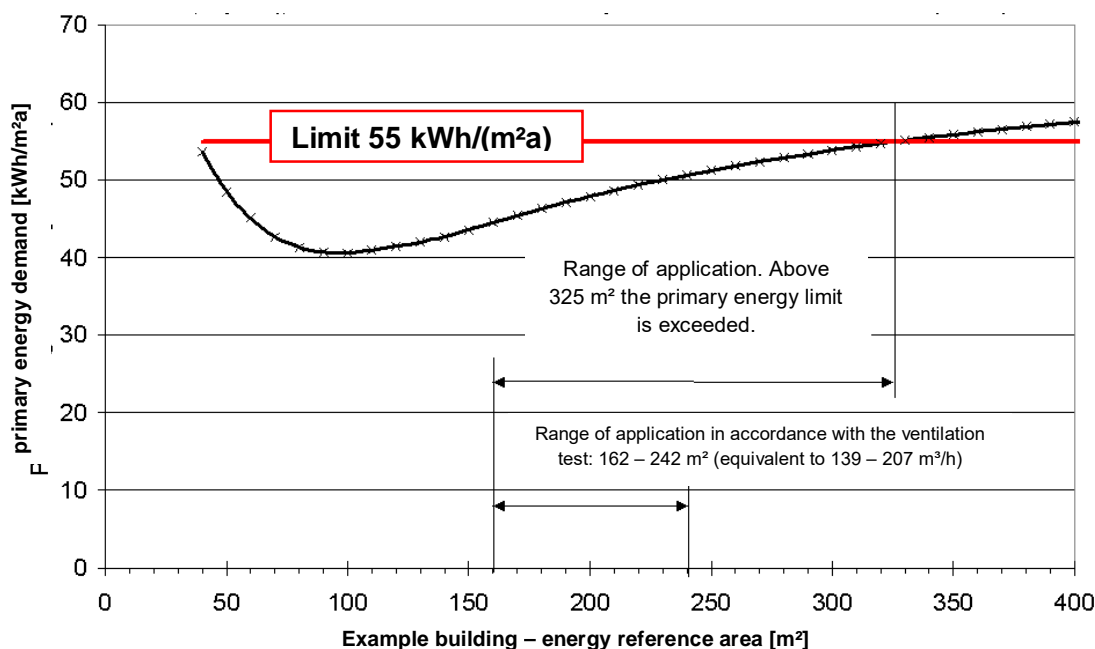


Figure 2:
The application range of the unit aerosmart m with respect to the size of the reference building.

(***) A full description of measured results (test report of PHI) is available from the manufacturer