CERTIFICATE

Certified Passive House Component

Component-ID 2424ch03 and 2425ch03

valid until 31st December 2025

Passive House Institute
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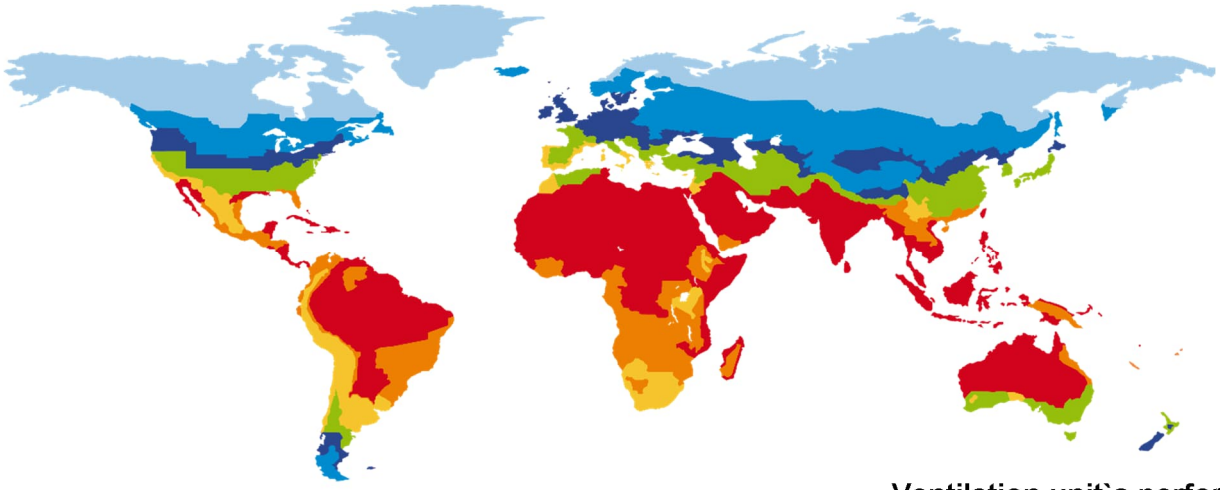
Germany



Category: **Compact unit**

Manufacturer: **J. Pichler Gesellschaft m.b.H**
Austria

Product name: **PKOM4A**[1)]

Type of heat pump:

Heat exchanger: recuperative

This certificate was awarded based on the product meeting the following main criteria (limit values):

Ventilation unit

Heat recovery rate	η_{HR}	≥	75 %
Specific electric power	$P_{el,spec}$	≤	0.45 Wh/m³
Leakage		<	3 %
Comfort	Supply air temperature ≥ 16.5 °C at outdoor air temperature of -10 °C		

Heat pump [2)]

Space heating	9 kWh/(m²a)
Space Heating + DHW	20 kWh/(m²a)
Space cooling (humid climate):	13 kWh/(m²a)
Space cooling (dry climate):	11 kWh/(m²a)

Ventilation unit`s performance: [1)3)]

Airflow range
70-220 m³/h
Heat recovery rate
η_{HR} = 78 and 84 %
Specific electric power
$P_{el,spec}$ = 0.34 and 0.29 Wh/m³
Humidity recovery rate
η_x = 64 %

Heat pump`s performance: [1)]

Heat Pump – space heating
6.7 kWh/(m²a)
Heat Pump – Heating + DHW
12.5 kWh/(m²a)
Cooling DRY
– kWh/(m²a)
Cooling HUMID
– kWh/(m²a)

[1)] all certified units and operational modes are listed in detail in the appendix of this certificate, see page 2 ff

[2)] limit values for final energy (electricity) demand

[3)] the unit is equipped with ventilation unit.

CERTIFIED COMPONENT
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Ventilation performance for all three operational modes

	Heat recovery	Electric Efficiency [Wh/m³]	Useful range of operation [m³/h]	Cert-ID
Pichler PKOM4A (2025) 130 m³/h	**77 % (at 2 °C)**	**0.34**	**70… 220**	**2424ch03**
Pichler PKOM4A (2025) 175 m³/h	**83 % (at 2 °C)**	**0.29**	**115… 220**	**2425ch03**
Pichler PKOM4A (2025) 250 m³/h	**86 % (at 7°C)**	**0.38**	**cooling only**	

Heat pump performance

Space Heating and Domestic Hot Water (DHW) preparation

		Operation						
		Space (air) heating	DHW	Total (SpH + DHW)	SPF	max. air flow	External pressure	Cert-ID
Mode No	Unit	kWh/(m²a)	kWh/(m²a)	kWh/(m²a)		m³/h	Pa	
1	130 m³/h	6.6	5.9	12.5	2.7	220	50	2424ch03
2	175 m³/h	6.7	5.7	12.4	2.7	220	50	2425ch03
3	250m³/h	cooling	only					

The listed final energy demand (electricity) for the HP system was derived from energy balance calculation of a reference building. For details see appendix, page 6.

The maximum useful operational range with respect to air flow was derived from the pressure losses and external pressure capacity respectively, which the unit is able to deliver.

Cooling: the units operating in mode No 2 and 3 (175 and 250 m³/h) can provide some air-cooling. In the table below, the power provided for supply air is given. For mode No 1 no explicit measurements about cooling performance are available.

This cooling power helps to improve summer indoor comfort by reducing indoor temperatures in addition to passive cooling measures like shading and passive night cooling by cross ventilation.

		Operation				
		HUMID		DRY		Cert-ID
Mode No	Unit	kWh/(m²a)	m²	kW	m²	
2	175 m³/h	–	–	0.83	–	2425ch03
3	250 m³/h	–	–	1.36	–	

Thermal Comfort: A minimum supply air temperature of 16.5 °C is reached with use of the heat pump. An underground air channel is not required.

Efficiency Criterion – heat: The heat recovery of the ventilation system incorporated in the unit demonstrates an efficiency as listed.

Efficiency Criterion – electricity: With a power consumption of 0.21 Wh/m³ to 0.39, see tables above the unit complies in each operational mode with the maximum consumption of 0.45 Wh/m³. The consumption of 10 W in standby-mode exceeds the target value of 1 W. As the unit is always in operation this value should be optimized.

Air tightness and thermal insulation: Testing the ventilation system showed that the limiting values of 1.4 % for both the internal and external leakages were not exceeded.

Control and calibration: A comparison of air volumes is performed automatically by the device. The required air volume can be adjusted via a control panel on the device with four set points. The volume rate of each set point can be programmed individually.

Humidity recovery: Indoor air humidity can be increased by using a system with moisture recovery in a cool, temperate climate, especially during the winter. These higher humidity levels will reduce evaporation from building elements and furniture during the heating period and thus have a positive effect on the building's heating demand. In order to account for this effect, the heat recovery efficiency is increased by a certain percentage, depending on the achieved level of moisture recovery. The humidity recovery rate for this unit is 64 %

In case the unit's moisture recovery rate is larger than 60 % its airflow rate must be controlled based on the indoor air humidity, in order to prevent temporarily probably too high humidity levels

Application of humidity recovery:

- In cool temperate climates, heat exchangers with moisture recovery should generally only be used if the moisture load inside the building is comparatively low (e.g. in a residential building with an occupancy rate significantly below the average).
- If moisture recovery > 60 % is to be used in a building with an average occupancy rate and typical use, the energy balance of the building is to be calculated with an increased airflow rate.

The manufacturer provides a control strategy for air flow rates as follows: The air flow can be controlled by CO2 level as well as humidity level. If humidity sensors are installed, an upper and a lower limit for humidity level can be defined. If the relative humidity is lower than e.g. 30 % the air flow is reduced. If the relative humidity is higher than 60 % air flow is raised continuously. As long as humidity is between the defined limit values, air flow rates according to set values are used.

Sound suppression: The acoustic pressure level was evaluated as 49 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, see figure 1.

The sound level coming from supply air ducts 42 dB(A) and extract air ducts 59 dB(A) respectively is similarly too high and thus adequate silencers have to be used always to keep the noise level in all living rooms and sleeping rooms below 25 dB(A) – the audacity threshold. The producer will specify a configuration of the silencers, see figure 2.

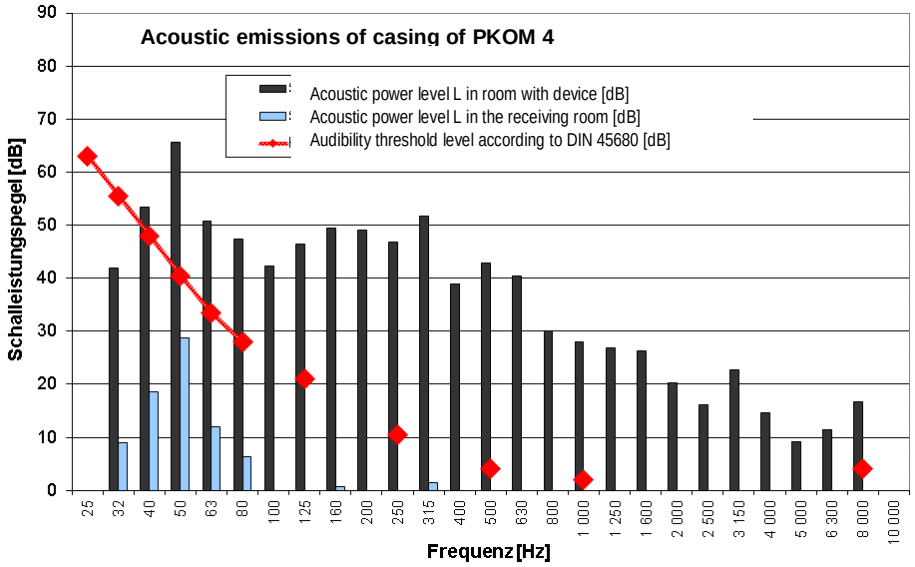

Figure 1: Noise emission of casing of unit PKOM 4 PKOM4A

The unit has to be placed inside a room, which is sufficiently noise separated

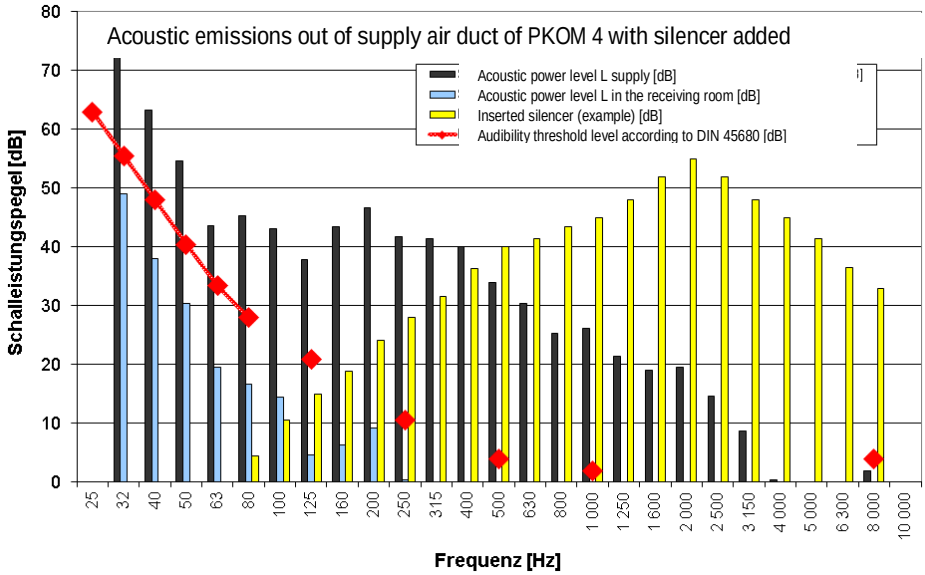

Figure 2: Acoustic emissions of supply duct of the unit PKOM 4. Manufacturer provides a suitable set of silencers

Hygienic Indoor Air: 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 or ISO ePM1 50%, attached in front, exhaust air filter G4 or ISO Coarse 60%. 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. An F7 and a G4 filter are installed respectively in the intake and exhaust air streams within the unit. This configuration is in accordance with the recommendations for Passive Houses.

For calculation of DHW consumption, the value of 25l/(person.day) of water at 60°C has been used (cold water temperature of 10°C). The volume of the DHW tank is 212 liters, see tables. The heat losses of DHW storage tank are included in the calculations.

Frost protection: The device is protected against the icing via a hydraulic circuit of the installed heat pump. An underground air channel is therefore not required. The minimum supply air temperature of 16.5 °C is ensured solely by the frost-protection circuit of the heat pump.

Assessment of the heat pump: The final energy (electricity) demand of the heat pump system installed in the reference building are listed in the table on page 2. The calculations were done for those operational modes, with measurement data available. The according seasonal performance factors (SPF) of the system for all operational modes are listed in the table as well.

This compact heat pump unit can be used in Passive Houses with an energy reference area (TFA, treated floor area) of 70 up to 300 m² respectively. The air volume flow has to be adjusted accordingly by using the operational modes No 1 or 2 as listed on page 2. The according energy balance calculation of the reference building is based on a typical occupancy of 35 m²/person, an air flow rate of 30 m³/h/person and a heating load of 12 W/m².

The outdoor air intake temperatures can be raised when a ground heat exchanger is used. The use of a typical ground heat exchanger will provide a better energetic performance of the system in a building, which may be calculated with PHPP for any concrete building.The unit was tested in combination with a specially selected **hot water storage.** If another 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.

The type of refrigerant used: R1234yf

Hint: The qualities (COP) of the heat pump were examined for the nominal air flows listed on page 2. The unit does not need to be operated necessarily exactly at one of these operational modes. In fact the air flow of the device must be adjusted for any configuration and size of the building according to the air flow which is needed to provide hygienic indoor air quality. For the energy balance calculation (PHPP) of the building the planer has to decide which point of operation is best compatible to the building configuration. According to that the key-values of the one or the other point of operation are to be chosen.

The **maximum available supply air temperature** at maximum heat load of the building – when the heat pump is running exclusively – is listed in the tables below. If there is a higher heat load needed for a building this may be realized by external electrical heaters. Then the available higher value ($T_{supplyair\_max}$) is taken for the sheet "heating load" in PHPP. In this case it must be assured that the direct-electrical backup heating is only used to cover the peak load. That means in detail: the direct electrical peak load heating may only be activated by the user if and only if the heat pump is working at full power and this thermal power is not enough. The maximum supply air temperature should never exceed 52 °C to avoid dust burning smell.

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Pichler PKOM 4 A data table with detailed parameters for PHPP worksheet 'Compact':

PKOM4A (130 m³/h) unit: Cert-ID 2424ch03

Space Heating

T Source [°C]	T Sink [°C]	HP heating Capacity [kW}	COP	Pel WP input [kW]	
12.10	40.10	0.924	3.85	0.240	
7.10	38.70	0.886	3.83	0.231	
2.00	35.80	0.846	3.78	0.224	
-3.10	35.00	0.704	2.65	0.266	
-10.00	34.70	0.690	1.81	0.382	
Max supply air temperature		35 °C			

Pichler PKOM 4 A data table with detailed parameters for PHPP worksheet 'Compact':

PKOM4A (175 m³/h) unit: Cert-ID 2425ch03

Space Heating

T Source [°C]	T Sink [°C]	HP heating Capacity [kW}	COP	Pel WP input [kW]	
12.00	36.60	1.034	4.61	0.224	
7.20	35.50	0.940	4.25	0.221	
2.20	35.00	0.910	3.52	0.259	
-3.10	34.60	0.981	3.24	0.302	
-9.20	32.70	0.725	1.37	0.527	
Max supply air temperature		35 °C			

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DHW & Storage: for both operational modes (ID 2424ch03 and ID 2425ch03)

DHW		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	**-7**	**2**	**7**	**20**	°C
Thermal Output Heat Pump for heating up storage tank.	P_{DHW} heating up	**0.84**	**1.15**	**1.38**	**1.67**	kW
Thermal Output Heat Pump for reheating storage tank	P_{DHW} reheating	**0.80**	**1.19**	**1.35**	**1.66**	kW
COP Heat Pump for heating up storage tank	$COP_{DHW,}$ heating up	**2.28**	**2.97**	**3.34**	**3.94**	-
COP Heat Pump for reheating storage tank	COP_{DHW} reheating	**2.02**	**2.88**	**3.10**	**3.76**	-
Averge storage tank temperature		**45**	**°C**			
Specific storage heat losses		**1.51**	**W/K**			
Nominal storage Volume		**212**	**Liter**			
Exhaust air addition (if applicable)		**200**	**m³/h**			