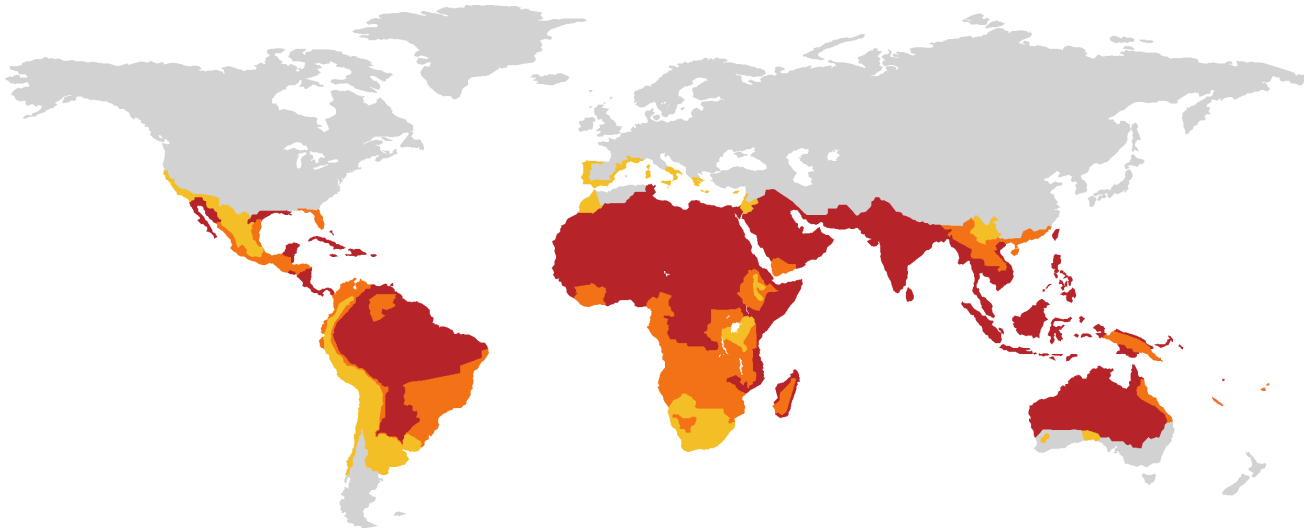


CERTIFICATE

Certified Passive House Component

Component-ID 2348vs07 valid until 31st December 2025

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category: **Air handling unit with heat recovery**
Manufacturer: **Qingdao Haier Air Conditioner Gen Corp., Ltd.**
P.R. China
Product name: **HQR-35QVPNC-U1 (summer)**
Specification: **Airflow rate < 600 m³/h**
Heat exchanger: **Recuperative with humidity recovery**

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

Cooling recovery η_{HR} \geq 70 %
Specific electric power $P_{el,spec}$ \leq 0.45 Wh/m³
Leakage $<$ 3 %

Airflow range

160 – 271 m³/h

Cooling recovery

$\eta_{HR,C} = 70 \%$

Specific electric power

$P_{el,spec} = 0.28 \text{ Wh/m}^3$

Humidity recovery

$\eta_x = 42 \%$

very hot climate



**CERTIFIED
COMPONENT**

Passive House Institute

Humidity recovery

In warm and humid climates, moisture recovery can significantly reduce the energy demand for active dehumidification and active cooling. In warm and humid or hot and humid climates therefore a humidity recovery of at least 60% is recommended together with active dehumidification. As an orientation, PHPP refers to moisture recovery if required.

Humidity recovery

$$\eta_x = 42 \%$$

Efficiency criterion (cooling recovery)

The cooling recovery rate is determined on the basis of laboratory measurements of the entire ventilation device with balanced mass flows on the outdoor air and exhaust air side according to following formula:

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

With

- $\eta_{HR,C}$ Cooling recovery 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)

Cooling recovery

$$\eta_{HR} = 70 \%$$

Efficiency criterion (electric power)

The overall electric power consumption of the device is measured at the test facility at an external pressure of 100 Pa (50 Pa, respectively, for the intake and outlet). This includes the general electric power consumption for operation and control.

Specific electric power

$$P_{el,spec} = 0.28 \text{ Wh/m}^3$$

Leakage

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

Internal leakage

1.9 %

External leakage

0.5 %

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). Balancing of the airflow rates of the unit is possible.

- This unit is certified for airflow rates of 160 – 271 m³/h.
- Balancing the air flow rates of the unit is possible.
 - ✓ The airflow volumes can be held steady automatically.
- The user should have at least following setting options:
 - ✓ Switching the system on and off.
 - ✓ Synchronized adjustment of the supply and extract airflows to basic ventilation (70-80%), standard ventilation (100%) and increased ventilation (130%) with a clear indication of the current setting.
- The device has a standby power consumption of 6 W. The target value of 1 W was slightly 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

The required limit for the sound power level of the device is 35 dB(A) in order to limit the sound pressure level in the installation room. The sound level target value of less than 25 dB(A) in living spaces and less than 30 dB(A) in functional spaces must be ensured by installing commercial silencers. The following sound power levels are met at an airflow rate of 271 m³/h.

Casing	Duct			
	Outdoor	Supply	Extract	Exhaust
42 dB(A)	74 dB(A)	63 dB(A)	74 dB(A)	62 dB(A)

- The unit does not fulfil the requirements for the sound power level. The unit must therefore be installed acoustically separated from living areas.
- One example of suitable silencers for supply and extract air ducts is mentioned in the detailed test report or can be obtained from the manufacturer. It is recommended to identify suitable silencers for each individual project.

Indoor air quality

The device must be equipped with following filter qualities:

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

On the outdoor air / supply air side, a fine filter of efficiency ISO ePM1 50% (F7 according to EN 779) or better is recommended. For the exhaust air side, a filter with at least ISO Coarse 60% efficiency (G4 according to EN 779) is recommended. If no standard configuration, a filter with recommended efficiency is offered as optional equipment or accessories by the manufacturer.

Condensate drain

Under certain circumstances condensate may occur on the supply air side. A condensate drain on the supply air side is therefore recommended, especially if exhaust air temperatures $< 25^{\circ}\text{C}$ are to be expected during the cooling period. If no condensate occurs, the condensate drain must be tightly closed.

The tested unit provides no condensate connection on the supply air side. A suitable condensate drain is offered by the manufacturer as an accessory.

Bypass of the heat recovery

A summer bypass is part of the unit and can optionally be controlled automatically. The effectiveness of the bypass for night cooling purpose of buildings was tested under following conditions:

- Exhaust air temperature 25°C , outdoor air temperature 16°C

The temperature increase of the supply air compared to the outdoor air was about 3 K. This is slightly more than 2 K which is recommended for summer bypass operation to allow for effective passive cooling.