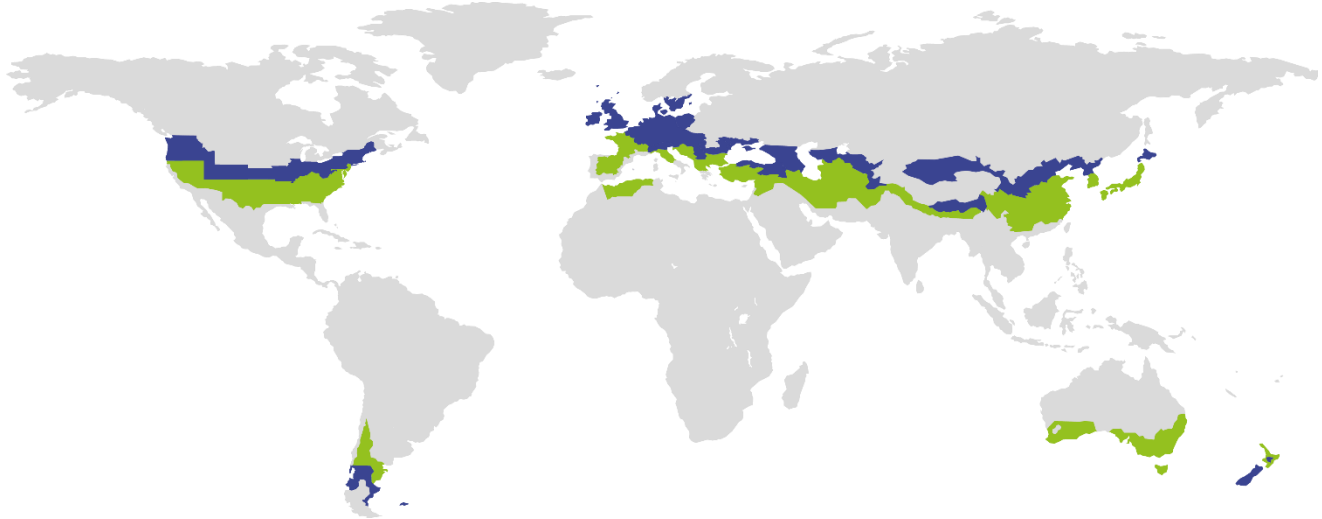


# CERTIFICATE

Certified Passive House Component

Component-ID 0826vs03 valid until 31st December 2019

Passive House Institute  
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Category: **Air handling unit with heat recovery**  
Manufacturer: **Zehnder Group AG,  
Paul Wärmerückgewinnung GmbH  
Germany**  
Product name: **ComfoAir 70**

Specification: Decentralised single room ventilation system  
Heat exchanger: Recuperative

**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 Wh/m <sup>3</sup>
Leakage		$<$	3 %
Performance number		$\geq$	10
Comfort			Supply air temperature $\geq$ 16.5 °C at outdoor air temperature of -10 °C

## Airflow range

15-25 m<sup>3</sup>/h  
(continuous operation)

15-40 m<sup>3</sup>/h<sup>1)</sup>  
(on-demand operation for  
elimination of increased loads)

## Heat recovery rate

$\eta_{HR} = 85 \%$

## Specific electric power

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

## Humidity recovery

$\eta_x = 64 \%$

cool, temperate climate



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## 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.

### Humidity recovery

$$\eta_x = 64 \%$$

- Adjustment of airflow by means of moisture control:
  - ✓ Since the moisture recovery of the heat exchanger exceeds a humidity ratio of 0.6, humidity controlled volume flow adjustment is required in order to avoid damage due to temporarily excessive indoor air humidity.
  - ✓ The device being tested does not provide this function.
- Application of moisture 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.
  - ✓ Adjustment of airflow by means of moisture control is required, even though that in case of low internal moisture the increased airflow rate is not needed often.

## Passive House comfort criterion

Temporarily lower supply air temperatures (14 °C) might occur due to the type of heat exchanger and frost protection strategy. Once the frost protection is active, the supply air temperature increases again to more than 16.5 °C.

## 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.

$$\eta_{HR} = \frac{(\theta_{ETA} - \theta_{EHA}) + \frac{P_{el}}{\dot{m} \cdot c_p}}{(\theta_{ETA} - \theta_{ODA})} + 0.08 \cdot \eta_x$$

with

$\eta_{HR}$  Heat recovery rate in %

$\theta_{ETA}$  Extract air temperature in °C

$\theta_{EHA}$  Exhaust air temperature in °C

$\theta_{ODA}$  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)

$\eta_x$  Humidity recovery in %

for  $\eta_x > 60$  %, the heat recovery increase ( $0.08 \cdot \eta_x$ ) is limited to a maximum of 4.80 %

#### Heat recovery rate

$$\eta_{HR} = 85 \%$$

#### Efficiency criterion (electric power)

The unit was examined with the following conditions, which correspond to the standard installation situation of the unit: Outdoor air and exhaust air free air intake and discharge, extract air free air intake, supply air side equipped with a ducting for connection of second room according to the manufacturer recommendations (pressure difference 50 Pa).

#### 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

$$\varepsilon_L = 0.74$$

#### Leakage

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

#### Internal leakage

$$0.64 \%$$

#### External leakage

$$1.88 \%$$



