CERTIFICATE

Certified Passive House Component

Component-ID 0869vs03 valid until 31st December 2017

Passive House Institute
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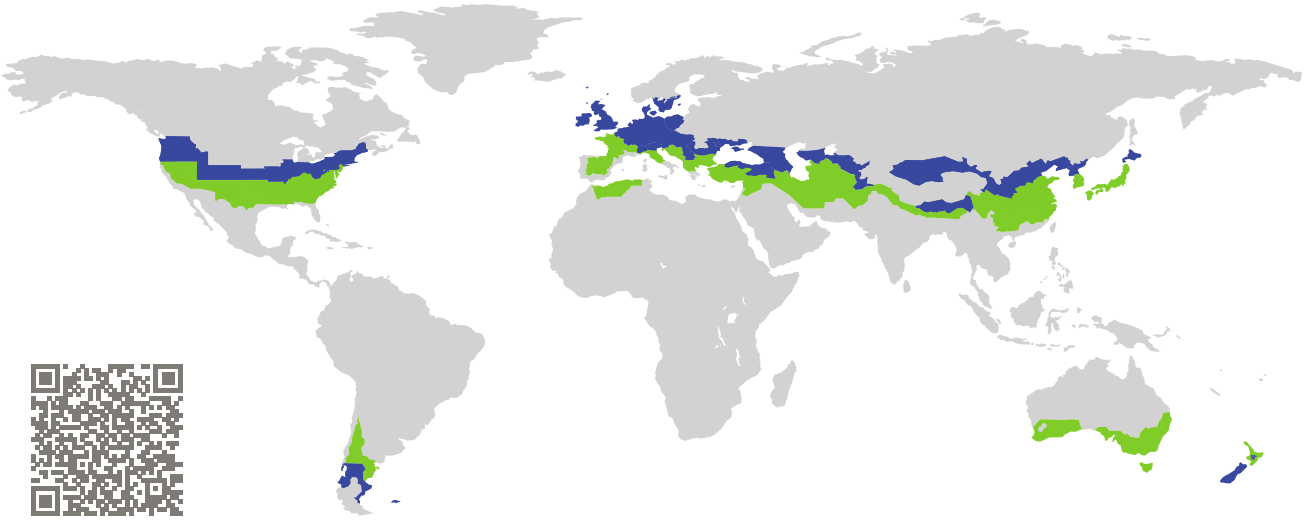

Category:	**Air handling unit with heat recovery**
Manufacturer:	**Zewotherm GmbH** **Germany**
Product name:	**ZA11LG150AF**

Specification:	Airflow rate < 600 m^3/h
Heat exchanger:	Recuperative

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

Heat recovery rate	η_{HR}	$\geq$	75 %
Specific electric power	$P_{el,spec}$	$\leq$	0.45 Wh/m^3
Leakage		$<$	3 %

Comfort	Supply air temperature $\geq$ 16.5 °C at outdoor air temperature –10 °C

Airflow range
80–111 m^3/h
Heat recovery rate
η_{HR} = 83 %
Specific electric power
$P_{el,spec}$ = 0.30 Wh/m^3
Humidity recovery
η_x = 71 %

cool, temperate climate

CERTIFIED COMPONENT

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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
η_x = 71 %

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 elevated humidity levels

✓ As default, this unit provides a function of air flow volume control according to the extract air humidity.

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.

Passive House comfort criterion

A minimum supply air temperature of 16.5 °C is maintained at an outdoor air temperature of -10 °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

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 W h/(kg K)
η_x	Humidity recovery in %
	for $\eta_x \geq 60\,\%$, the heat recovery increase $(0.08 \cdot \eta_x)$ is limited to a maximum of 4.80 %

Heat recovery rate
η_{HR} = 83 %

Efficiency criterion (electric power)

The overall electrical 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 electrical power consumption for operation and control but not for frost protection.

Specific electric power
$P_{el,spec}$ = 0.30 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
ϵ_L = 0.69

Leakage

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

Internal leakage	External leakage
0.82 %	0.64 %

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).

- This unit is certified for airflow rates of 80–111 m^3/h.
- Balancing the airflow rates of the unit is possible.
- The user should have at least all the 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 0.97 W and therefore complies with the target value of 1 W.
- 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 111 m^3/h:

Device	Duct			
	Outdoor	Supply air	Extract air	Exhaust air
46.6 dB(A)	42.1 dB(A)	64.0 dB(A)	46.1 dB(A)	59.0 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

This unit is equipped with following filter qualities by default:

Outdoor air filter	Extract air filter
F7	G4

On the outdoor air/ supply air side the filter quality class F7 is recommended. If not standard configuration, the F7 filter is available as accessory part.

Frost 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 °C). It must be ensured that the unit's ventilation performance is not affected during frost protection cycles.

- Frost protection of the heat exchanger:
  - ✓ An internal electric heating element with a power of 750 W can be optionally installed. The heating element is switched on in the case that the exhaust air temperature drops below -4.5 °C or if a temperature difference between supply and extract oversteps a pre-set value. The integrated frost-protection strategy, which is based on defrosting the heat exchanger by means of switching off the supply air fans, is not suitable for Passive Houses and was not tested.
- Frost protection of downstream hydraulic heater coils:

✓ This unit provides a frost protection of the downstream hydraulic heater coils. In the case the hydraulic post-heating coil is used, the unit is automatically switched off when the supply air temperatures goes down under 5 °C.