CERTIFICATE

Certified Passive House Component

Valid until 31st December 2026

Passive House Institute
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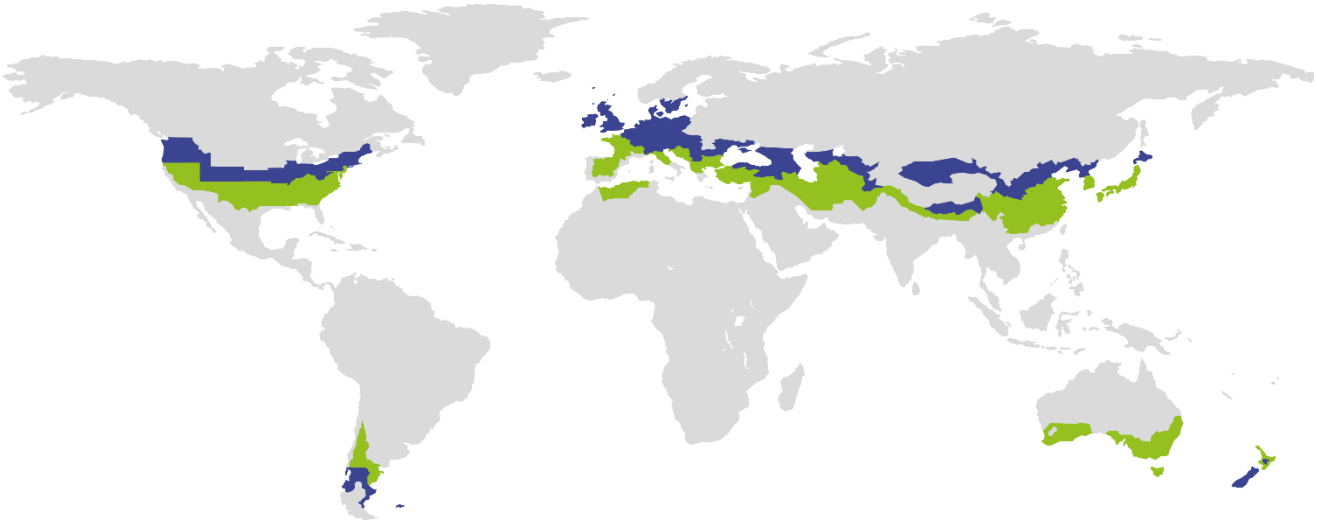

Category:	**Air handling unit with heat recovery**
Manufacturer:	**J. PICHLER Gesellschaft m.b.H. Austria**
Product name:	**Ventilation unit series LG 750-4000**

Specification:	Airflow rate > 600 m³/h
Heat exchanger:	Recuperative

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

Heat recovery rate	η_{HR}	≥	75 %
Specific electric power	$P_{el,spec}$	≤	0.45 Wh/m³
Leakage		<	3 %
Performance number		≥	10
Comfort	Supply air temperature ≥ 16.5 °C at outdoor air temperature of -10 °C [1)]		

Airflow range
450-3300 m³/h at an external pressure of 155-298 Pa
Heat recovery rate
η_{HR} ≥ 81 %
Specific electric power
$P_{el,spec}$ ≤ 0.42 Wh/m³
Performance number
> 10

cool, temperate climate

CERTIFIED COMPONENT

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[1)] Achieved by use of a suitable frost protection strategy.

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Component ID	Unit model	Testing requirements	Airflow range Min m³/h	Airflow range Max m³/h	External pressure Pa	In-operating pressure drop of filters Pa	Actual available external pressure [1] Pa	Specific electric power Wh/m³	Heat recovery rate %	Performance number -
0803vl03	LG 750	Residential	400	600	155	17	138	0.34	82	12
		Non-residential	450	750	204	21	183	0.41	82	10
0740vl03	LG 1000	Residential	450	1000	187	20	167	0.35	81	13
		Non-residential	450	1200	233	25	208	0.42	82	11
0804vl03	LG 2500	Residential	1000	2000	230	21	209	0.37	81	11
		Non-residential	1100	2160	271	23	248	0.42	82	10
0805vl03	LG 4000	Residential	1600	2600	246	18	228	0.35	81	12
		Non-residential	1600	3300	298	24	274	0.42	82	10

Table 1: Certified parameters of ventilation units. Valid for variants Internal (IN), Weather resistant (WF) and Roof integrated (DINT).

Passive House comfort criterion

A supply air temperature of 16.5 °C is maintained at an outdoor air temperature of about -10.0 °C by use of a suitable frost protection strategy.

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.

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

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 Wh/(kg.K)

- The heat recovery rates for each model of the unit are listed in Table 1.

Airflow range and external pressure difference

The operational range of the device results from the efficiency criterion (see below). As per the certification criteria for ventilation units > 600 m^3/h the applicable pressure differences vary with the nominal range of operation (as declared by the producer) and the application (residential or non-residential building).

The external pressure difference includes all pressure losses of the ventilation system caused by components apart from the tested unit (consisting of casing, heat exchanger and fans). If filters are installed inside of the unit, their pressure losses are to be reduced accordingly. The average filter pressure drop of an operational filter is assumed to be 30% higher than that of the clean filter.

- The airflow ranges and available external pressures for each model of the unit are listed in Table 1.

Efficiency criterion (electric power)

The overall electrical power consumption of the device including controllers was measured at the test facility as per the requirements for non-residential/residential buildings at an external pressure difference of 155-298 Pa.

- The specific electric powers for each model of the unit are listed in Table 1.

Performance number

Based on the measured values for the calculation of heat recovery efficiency and power consumption and on the climatic data of central Europe (Gt: 84 kKh, heating time: 5400 h/a), an average performance number at the airflow range was determined.

- The performance numbers for each model of the unit are listed in Table 1.

Leakage

The airtightness of the unit is tested for under pressure and over pressure before the thermodynamic test is conducted. As per the certification criteria the leakage airflows must not exceed 3 % of the average airflow of the device's operating range.

- These appliances meet the airtightness requirements.

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). Availeable operation modes are explained in detail in the operation manual.

- Balancing of the airflow rates of the unit is possilbe.
  - ✓ The airflow volumes can be held steady automatically (by measurement of pressure differences in extract and supply air duct).
- The standby power consumption of these devices makes 7.5 W. The target value of 1 W was 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

A ventilation unit > 600 m³/h is assumed to be operated in an installation room, for which sound limits are defined in the applicable regulations. The total acoustic power levels were determined by producer for each model of the units at an upper limit of the airflow range.

Unit model	Testing requirements	Airflow range		Total acoustic power level				
					Duct			
		Min	Max	Casing	ODA	SUP	ETA	EHA
		m³/h	m³/h	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
LG 750	Residential	400	600	55.9	56.9	66.2	59.3	68.9
	Non-residential	450	750	58.8	58.3	70.2	60.5	72.9
LG 1000	Residential	450	1000	55.4	56.0	72.1	62.0	71.1
	Non-residential	450	1200	56.6	59.4	76.4	63.2	74.0
LG 2500	Residential	1000	2000	56.8	56.2	76.0	58.8	76.9
	Non-residential	1100	2160	59.0	58.2	77.9	60.7	79.8
LG 4000	Residential	1600	2600	59.1	58.6	75.6	60.8	78.3
	Non-residential	1600	3300	63.3	61.9	80.1	64.1	81.8

Tabele 2: Acoustic power levels at an upper limit of the airflow range.

- For complying with the required sound level in the supply air and extract air rooms, dimensioning of a suitable silencer is required for the specific project on the basis of the measured sound level.

Indoor air quality

Instructions for changing of the air filters are documented in the operation manual. This device is equipped with following filter qualities:

Outdoor air filter	Extract air filter
F7	M5

If the device is not operated during summer, the filter should be replaced before the next operation. The producer of the device has to ensure that based on the latest findings, room air hygiene can be maintained by means of integrated or obligatory components.

For the operation of ventilation systems a strategy for avoiding permanent moisture penetration of the outdoor air filter needs to be considered. The strategies are mentioned in the full report and can be implemented through installation of either an additional component of the ventilation device or on the ventilation site system.

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:
  - ✓ As per manufacturer information, in order to protect the heat exchanger from freezing, one of three following frost protection strategies can be applied:
    - Frost protection via heat exchanger bypass

      The freezing of the heat exchanger can be prevented by using of bypass between outdoor and supply air. Cold outdoor air is diverted through the bypass canal around the heat exchanger, which is being defrosted through the warm extract air. In case of use of this frost protection strategy, use of an additional post-heater on the supply air stream is recommended.
    - Frost protection via hydraulic pre-heater

      Further, the frost protection of heat exchanger can be ensured by pre-heating of incoming outdoor air via hydraulic pre-heater. Suitable hydraulic pre-heater is available as an additional equipment for these units.
    - Frost protection via electric pre-heater

      In order to pre-heating the incoming air, the unit series LG can be optionally equipped with an electric pre-heater. Suitable electric pre-heater is available as an additional equipment for these units.

      In consideration of primary energy consumption, direct electrical preheating of outdoor air cannot be recommended for these appliances.
- Frost protection of downstream hydraulic heater coils:
  - ✓ As described in the technical manual this appliance shuts down both the fans if the supply temperature drops below 5 °C behind the heater coil.

  It should be noted that, due to free circulation, cold air can also lead to freezing – even when the fans are stationary. This can only be ruled out if the air duct is closed (by means of a shut-off flap).

Bypass of the heat recovery

An automatically controlled summer bypass of the heat exchanger is part of this device. The effectiveness of bypass for night cooling of buildings has not been investigated within the scope of this testing.