CERTIFICATE

Certified Passive House Component

Valid until 31st December 2023

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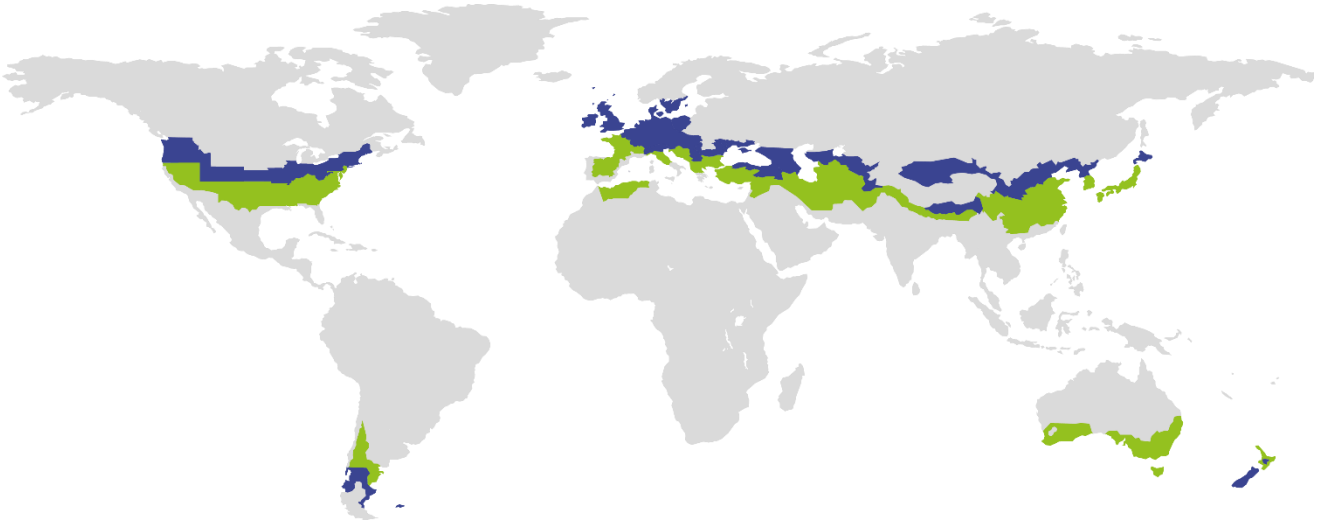

Category:	**Air handling unit with heat recovery**
Manufacturer:	**FläktGroup Deutschland GmbH Germany**
Product name:	**Ventilation unit series COM4mini CC20-CC60**
Specification:	Airflow rate > 600 m³/h
Heat exchanger:	Recuperative

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		

Airflow range
280-1500 m³/h at an external pressure of 190-247 Pa [1)] Requirements non-residential buildings (Therefore also applicable for residential buildings)
Heat recovery rate
η_{HR} ≥ 80 %
Specific electric power
$P_{el,spec}$ ≤ 0.45 Wh/m³
Performance number
> 9 [2)]

[1)] The pressure drop of filters is covered in the listed external pressure. Additional components (e.g. heating coil) decrease the available external pressure accordingly.

[2)] The recommended value of 10.0 was not achieved.

cool, temperate climate

CERTIFIED COMPONENT

Passive House Institute

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Component ID	Unit model	Testing requirements	Airflow range		External pressure	Actual available external pressure [1]	Specific electric power [2] [3]	Heat recovery rate [3]	Performance number [4] [5]
			Min	Max					
			m³/h	m³/h	Pa	Pa	Wh/m³	%	-
0231vl03	CC20	Non-residential	280	460	190	135	0.45	82	9.0
0909vl03	CC40	Non-residential	640	1030	228	180	0.45	80	9.2
0787vl03	CC60	Non-residential	-	1500	247	180	0.43	80	9.6

Table 1: Certified values for each unit model.

[1] Pressure drop of filters were taken into account.

[2] For COM4mini CC20: At the lower limit of the airflow range the target value is exceeded with 0.49 Wh/m³.

[3] For COM4mini CC40: Defined on the basis of measurements on the identically constructed units of different airflow rate ranges in test laboratories and of the Manufacturer Software.

For COM4mini CC60: Metrologically defined value related to the upper airflow rates 1440 / 1499 / 1504 m³/h.

[4] For COM4mini CC40: Defined value related to the airflow rates 638 / 834 / 1030 m³/h.

For COM4mini CC60: Defined value related to the upper airflow rates 1440 / 1499 / 1504 m³/h.

[5] The recommended value of 10.0 was not achieved.

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 post-heating element.

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 buildings at an external pressure difference of 190-247 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 at the fan inlet nozzle, only available if pressure gauges are installed and the control system is equipped with the additional mode).
- The standby power consumption of these devices makes 15.1 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)
CC20	Non-residential	280	460	51	57	66	57	65
CC40	Non-residential	640	1030	56	60	76	60	77
CC60	Non-residential	-	1500	57	59	79	63	79

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:
  - ✓ This series of ventilation units is equipped with an outdoor-supply air bypass, which is controlled according to the exhaust air temperature. The outdoor airflow volume passing the heat exchanger there with can be reduced steadily down to 30 % of the supply airflow volume. This strategy allows frost protection without preheater coil in the outdoor air stream, but to avoid supply air temperatures < 16.5 °C in winter a supplementary supply air heater is mandatory. For this purpose the manufacturer recommends either the hydraulic heater coil PWW-NK, or the electric heater coil EH.
- Frost protection of downstream hydraulic heater coils:
  - ✓ As default, this series of ventilation units is not equipped with frost protection for downstream hydraulic heater coils. In order to achieve this function, the unit has to be additionally equipped with a thermostat in a supply air stream which ensures that both fans are switched off in case the outdoor temperature drops below 5 °C.

  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 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.