Certificate

Certified Passive House Component

For cool, temperate climates, valid until 31 December 2018

Passive House Institute
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GERMANY

Category: **Heat recovery unit**

Manufacturer: **FläktGroup Deutschland GmbH**
44625 Herne, GERMANY

Product name: **Series COM4mini CC20 – CC60**

This certificate was awarded based on the following criteria:

Thermal comfort	$\theta_{supply\ air} \geq 16.5$ °C at $\theta_{outdoor\ air} = -10$ °C
Effective heat recovery rate	$\eta_{HR,eff} \geq 75$ %
Electric power consumption	$P_{el} \leq 0.45$ Wh/m³
Performance number	≥ 10
Airtightness	Interior and exterior air leakage rates less than 3 % of nominal air flow rate
Balancing and adjustability	Air flow balancing possible: yes Automated air flow balancing: yes[2]
Sound insulation	It is assumed that large ventilation units are installed in a separate building services room. Sound levels documented in the appendix of this certificate
Indoor air quality	Outdoor air filter F7 Extract air filter G4
Frost protection	Frost protection required Different strategies mentioned in the appendix of this certificate

1) Available pressure difference with installed filters. Additional components (e.g. heater coil) decrease the available pressure difference accordingly.
2) Only with optional pressure measurement and - control system.
3) Recommended performance number of 10 is deceeded,

Further information can be found in the appendix of this certificate.

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Certified for air flow rates of: 280 - 1500 m³/h at an external pressure of 190 - 247 Pa [1]
Requirements nonresidential buildings (Therewith device also applicable for residential building)

$\eta_{HR,eff}$ ≥ 80 %

Electric power consumption ≤ 0.45 Wh/m³

Performance number ≥ 9 [3]

CERTIFIED COMPONENT
Passive House Institute

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FläktGroup Deutschland GmbH, Series COM4mini CC20 – CC60

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Component ID	Model	Testing requirements	Air flow range		External pressure	Available external pressure [1]	Electro-efficiency [2] [3]	HRR [3]	Performance number [4]
			Min	Max					
			m³/h	m³/h	Pa	Pa	**Wh/m³**	**%**	**-**
0231vl03	COM4mini CC20	Non-residential	280	460	190	135	**0,45**	**82**	**9,0**
0909vl03	COM4mini CC40	Non-residential	640	1030	228	180	**0,45**	**80**	**9,2**
0787vl03	COM4mini CC60	Non-residential	-	1500	247	180	**0,43**	**80**	**9,6**

Table 1: Results of the certified devices

1) less assumed filter pressure drops

2) For COM4mini CC20: At the lower limit of the air flow 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 air flow rate ranges in test laboratories and of the Manufacturer Software

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

4) For COM4mini CC40: defined value related to the air flow rates 638 / 834 / 1030 m³/h

For COM4mini CC60: defined value related to the upper air flow rates 1440 / 1499 / 1504 m³/h

The recommended performance number is deceeded

Passive House comfort criterion

A minimum supply air temperature of 16.5 °C is maintained at an external air temperature of -10 °C if an adequate post heater coil is installed.

Effective heat recovery rate

The effective dry heat recovery rate is determined at the test facility using balanced mass flows on the outdoor air and extract air side and partly determined on the basis of the manufacturer software. The boundary conditions for the calculation were taken from the documents relating to the testing procedure.

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

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The (dry) ventilation heating load (building is the system boundary: Plus Infiltration) can be calculated:

$$Q_{Ventilation,dry} = V \cdot \left(100\,\% - \eta_{HR,eff}\right) \cdot 0{,}34\,\Delta\vartheta$$

In case of condensation the heat recovery rate is usually higher. For the thermodynamic assessment air conditions are chosen which exclude condensation.

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

Air flow 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 m³/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 air flow ranges and available external pressures for each model of the units are listed in Table 1.

Efficiency criterion (power consumption)

The overall electrical power consumptions of the devices including controllers were determined as per requirements at a corresponding external pressure differences for each model of the unit.

Based on the calculated values 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 corresponding air flow range was determined.

The overall electric power consumptions at the corresponding external pressure differences as well as the performance numbers for each model of the units are listed in Table 1.

Airtightness and insulation

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 air flows must not exceed 3 % of the average air flow of the device's operating range.

Following leakage rates for two particular unit sizes COM4mini CC20, CC 60 were measured:

Internal leakage: ≤ 3%

External leakage: ≤ 3%

Therefore, the air tightness requirements are met.

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Balancing and adjustability

The ventilation unit must provide the opportunity to adjust the balance between the exhaust and outdoor air flow (unit located inside of the thermal envelope) or the extract and supply air flow (unit located outside of the thermal envelope). Possible operation modes are explained in detail in the operation manual.

- Balancing the air flow rates:
  - ✓ Automated air flow balancing (by measurement of pressure differences at the fan's injections)
  - ✓ Manuel by the installer.
- The standby consumption of this ventilation appliance of 15.1 W is relatively high. In order to avoid unnecessary standby losses, a manual switch for complete disconnection from the power supply should be installed.
- After a power failure, the device will automatically continue to operate in the mode that was set before the power failure.

Acoustic 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 at an upper air flow range.

The results can be found in Table 2.

Model	Testing requirements	Air flow range		Total acoustic power level [1)]				
		Min	Max	Casing	ODA	SUP	ETA	EHA
		m³/h	m³/h	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
COM4mini CC20	Non-residential	280	460	51	57	66	57	65
COM4mini CC40	Non-residential	640	1030	56	60	76	60	77
COM4mini CC60	Non-residential	-	1500	57	59	79	63	79

Table 2: Acoustic emissions at the upper air flow range

1) Values for COM4mini CC40 were provided by manufacturer.

- 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.

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Indoor air quality

This device is equipped with following filter qualities:

- ✓ Outdoor Air filter F7
- ✓ Extract Air filter 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 must be provided in order to avoid icing inside the heat exchanger and freezing of the hydraulic post-heater coil during winter at extreme temperatures (-15 °C). The actual function of the ventilation device must not be impaired by the regular operation of the frost protection system. A sufficient air supply must be provided with balanced air flows. Infiltration due to excess extract air would cause an unacceptable heat load. For the frost protection of the hydraulic post-heater coil the failure of a pre-heater coil or the exhaust air fan needs to be considered.

- Frost protection circuit for the heat exchanger:
  - ✓ The device is equipped with an outdoor – supply air bypass, which is controlled after the exhaust air temperature. The outdoor air flow passing the heat exchanger there with can be reduced steadily down to 30% of the supply air flow. This strategy allows frost protection without preheater coil in the outdoor air flow, but to avoid supply air temperatures < 16.5°C in winter a supplementary heat is mandatory. For this purpose the manufacturer recommends either the hydraulic heater coil PWW-NK or the electric heater coil EH.

    The Passive House Institute recommends to install the frost protection strategy with hydraulic heater coil which is primary energetically favorable.
- Frost protection circuit for downstream hydraulic heater coils:
  - ✓ This device is <u>not</u> equipped with an internal frost protection shutdown to prevent hydraulic heater coils from frost. For that reason a thermostat (provided by the consumer) must be installed in the supply air flow which causes a shut off of both fans if the supply air temperature falls below the nominal value of 5°C.

  It should be noted that cold air can also lead to freezing of stationary fans due to free circulation; 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.

Abbreviations

- ODA = Outdoor air
- EHA = Exhaust air
- SUP = Supply air
- ETA = Extract air