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REPORT

WRG 472
DIN EN 13141-7

Test laboratory	TÜV SÜD Industrie Service GmbH Center of Competence for Refrigeration and Air Conditioning Air Conditioning and Ventilation
Test object	Central ventilation unit with heat recovery type „HRC-225" from the company ORCON bv Landjuweel 25 3905 PE Veenendaal / Nederlands
Customer	ORCON bv Landjuweel 25 3905 PE Veenendaal / Nederlands
Scope of assignment	Tests according to DIN EN 13141-7:2011-01
Date of receipt of test object	2016-08-10
Test period	2016-08-11 - 2016-10-27
Test location	Munich
Expert	Thomas Busler
Test specification	DIN EN 13141-7:2011-01 DIN EN ISO 5801:2011-11 DIN EN 308:1997-06

Date: 2016-12-29

Our reference:
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Order-No.. 2656563

This document consits of
9 Pages + 20 Appendices

The test results refer exclusively to the units under test.

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1. Scope of testing

The company ORCON bv, Landjuweel 25, 3905 PE Veenendaal / Nederlands ordered tests to be conducted on a ventilation unit with heat recovery type „HRC-225“ in accordance with the standard DIN EN 13141-7:2011-01.

2. Description of the ventilation unit type „HRC-225“

The structure of the ventilation unit with heat recovery is pictured in figure 1.

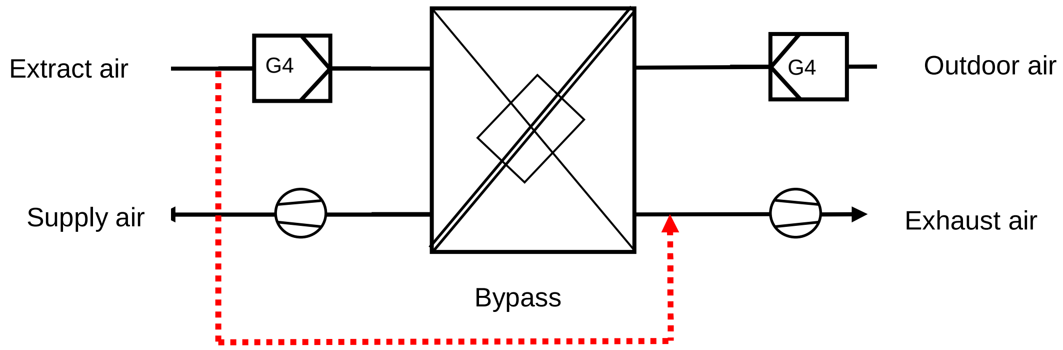


Figure 1: Schematic diagram of the central ventilation unit with heat recoverytype „HRC-225“ of the company ORCON bv

Images of the ventilation unit with heat recovery are shown in Appendices A.

Data pertaining to the tested ventilation unit and its built-in components are listed in Appendices B.

The unit is suitable for mounting on the floor and on the wall.

The unit has a condensate drain connection at the bottom. Exhaust air side condensate can be removed by a free discharge.

3. Procedure of the tests

The tests were performed at the test facilities of the Center of Competence for Refrigeration and Air Conditioning of the TÜV SÜD Industrie Service GmbH.

The tests comprise the reception inspection, the tightness tests, the ventilation tests and the thermodynamic tests.

A list of the used measurement equipment is deposited at the test centre.

3.1. Reception inspection

The relevant technical data of the ventilation unit were recorded during the reception inspection.

3.2. Leakage test

3.2.1. External leakage test

The external leakage of the ventilation unit was determined by means of establishing a pressure difference between the interior of the unit and its environment. The measured air volume flow required to maintain the pressure difference constitutes the external leakage.

3.2.2. Internal leakage test

In order to determine the leakage volume flow between the exhaust air / extract air side and the outdoor air / supply air side, the exhaust air / extract air side of the unit were pressurised and a volume flow was supplied to or extracted from the outdoor air / supply air side, so as to keep the differential pressure between the environment and the outdoor air / supply air side at zero.

As there is no differential pressure between the environment and the outdoor air / supply air side, the leakage volume flow corresponds to the ingoing or outgoing volume flow which exists when the specified differential pressures are adjusted.

3.3. Ventilation test

The ventilation test was conducted with a test chamber in accordance with the standard DIN EN ISO 5801:2012-11. The air temperature during the test was 21°C +/- 2 K.
The measurement of the air flows was done at both airflow directions simultaneously at the same pressure level.

The measured air flow curves include the following working points:

q_{min}	(4 V)	at	50 Pa
	(6 V)	at	50 Pa
$0.7 \times q_{vd}$	(7.4 V)	at	50 Pa
	(8 V)	at	100 Pa
q_{vd}	(10 V)	at	100 Pa

The recorded real electric power consumption values relate to the entire unit.
The specific power input of the ventilation unit was related to the supply air flow.

3.4. Filter-bypass leakage

By the reception inspection, the filter bypass leakage will be visually checked.

The filter and the filter frame shall be constructed in order to achieve an easy change of the filter and a tight fitting of the filter.

The tight fitting of the filter shall not be influenced by humidity.

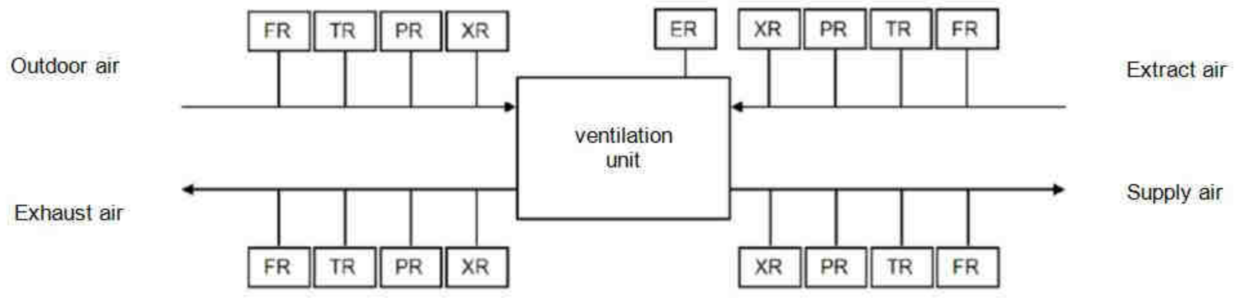
3.5. Thermodynamic test

The thermodynamic test was conducted in a double climate chamber.

The data pertaining to the incoming and outgoing airflow (temperature, humidity, air volume flow) and the total real electric power consumption of the ventilation unit were recorded at the system boundaries of the central ventilation unit.
Hereby the caloric mean temperature[1] was determined in accordance with the standard DIN EN 308:1997-07.

The entrance of the extract air into and the outlet of the exhaust air, as well as the entrance of the outdoor air into and the outlet of the supply air of the ventilation unit, were defined as system boundaries.

A scheme of the thermodynamic test setup is shown in Figure 2.



Symbols:

Group 1	Measuring device	Group 2	Measuring device
F	Volume flow	R	Recording
T	Temperature		
E	Electrical Data		
X	Humidity		
P	Static pressure		

Figure 2: Scheme of the thermodynamic test,

[1] The caloric mean temperature describes the mean temperature of the temperature probes at the system boundaries of the unit, which is the basis for the calculation of the energy content of the air flows.

The thermodynamic tests were performed at the following conditions:

	Symbol	Condition 1
Outdoor air dry bulb temperature	t_{21}	7 °C
Outdoor air wet bulb temperature	twb_{21}	-
Extract air dry bulb temperature	t_{11}	20 °C
Extract air wet bulb temperature	twb_{11}	12 °C

Here the following air flows and external static pressures were preset:

q_{min}	(4 V)	40	m³/h at	50 Pa
	(6 V)	114	m³/h at	50 Pa
0.7 x q_{vd}	(7.4 V)	157	m³/h at	50 Pa
	(8 V)	149	m³/h at	100 Pa
q_{vd}	(10 V)	225	m³/h at	100 Pa

4. Test results

4.1. Reception inspection

The identified relevant technical data of the ventilation unit and its installed components are listed in Appendices B.

The visual inspection of the central ventilation unit yielded the following results:

- Unit labelling
  - The unit was equipped with a type plate.
  - The unit is marked with a CE sign.
- Electrical safety
  - The electrical parts are accessible if the cover of the unit was open.
  - Tools are required for opening the unit cover.
  - By opening the unit cover the ventilation unit is not switched off via a contact switch.
- Mechanical safety
  - The unit will not be cut out by opening the unit cover.
  - Tools are required for opening the unit cover.
- Operation and installation
  - The unit is operated by a control panel.
  - There were two control panels delivered with the unit:
    Basic Panel control: on/off, possibility to change the speeds
    Pro Panel Control: on/off, possibility to change the speeds and ventilation mode
    (balanced ventilation/ only supply air/ only exhaust air)
  - The tests were made with the Basic Panel Control.
  - The fans were controlled by an external control voltage (of the laboratory).
- Maintenance
  - The filters are situated at the outdoor and extract side. They can be removed after opening the filter cover panel.

4.2. Tightness test

The results of the external and internal tightness test are listed in Appendix C.
The maximum declared air volume flow (q_{vd}) of the ventilation unit is 224 m³/h.
The leakage related to the maximum declared air volume flow is:

	Filter-combination	-250 Pa	+250 Pa	Leakage class
external leakage	G4 / G4	0.7 %	0.6 %	A1

	Filter-combination	-100 Pa	+100 Pa	Leakage class
internal leakage	G4 / G4	0.6 %	0.7 %	A1

According to the standard DIN EN 13141-7:2011-01, the leakage class is A1.

4.3. Ventilation test

The pressure-airflow curves of the exhaust air / extract airside and the outdoor air / supply air side are shown in Appendices D.

The values measured in the ventilation test are listed in Appendices E.

4.4. Filter-bypass leakage

By the visual inspection it was determined that the outdoor air filter is placed in an appropriate slot and has a tight fitting.

The filter frame of the extract air filter has no special slot suitable for this size of filter.
Therefore this filter is not fixed in an appropriate slot.

4.5. Thermodynamic test

Thermodynamic test points are shown in Appendix F.
The measurements and calculated values from the thermodynamic test are listed in Appendix G.

5. Summary
5.1. Reception inspection

The unit was equipped with a type plate and marked with a CE sign.

The fans are situated on the exhaust air side and the supply air side.

5.2. Tightness test

The leakage class according to the standard DIN EN 13141-7:2011-01 is A1.

5.3. Ventilation test

The pressure-airflow curves of the exhaust air / extract airside and the outdoor air / supply air side are shown in Appendices D.

The values measured in the ventilation test are listed in Appendices E.

5.4. Filter-bypass leakage

By the visual inspection it was determined that the outdoor air filter is placed in an appropriate slot and has a tight fitting.

The filter frame of the extract air filter has no special slot suitable for this size of filter. Therefore this filter is not fixed in an appropriate slot.

5.5. Thermodynamic test

For the ventilation unit the following type specific data were determined:
(see also Appendix G):

Air volume flow		Temperature ratio related to supply side $\eta_{\theta,su}$ in %	Temperature ratio related to exhaust side $\eta_{\theta,exh}$ in %
		$\Theta_{outdoor\ air} = 7°C$	$\Theta_{outdoor\ air} = 7°C$
q_{min}	4 V	92.5	70.8
	6 V	90.9	74.5
0.7 x q_{vd}	**7.4 V**	**88.6**	**74.5**
	8 V	90.4	74.2
q_{vd}	10 V	87.5	71.6

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Air volume flow		Spezific elect. power input p_{el} in W/(m³/h)[2]
		$\Theta_{outdoor\ air}$ = 7°C
q_{min}	4 V	0.45
	6 V	0.30
0.7 x q_{vd}	**7.4 V**	**0.32**
	8 V	0.40
q_{vd}	10 V	0.48

Center of Competence for
Refrigeration and Air Conditioning
Head of Laboratory

Andreas Klotz

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Appendices

Appendices A1 to A10	Images of the test sample
Appendices B1 to B3	Data pertaining to the tested unit
Appendix C	Results of the tightness tests
Appendices D1 and D2	Pressure-airflow curves
Appendices E1 and E2	Measurements from the ventilation test
Appendix F	Thermodynamic test points
Appendix G	Measurements and calculated values from the thermodynamic test

[2] To determine the specific power input, the average of the supply and extract air flow rate was used.

Images of the test sample

Figure A-1: Front view of the ventilation unit

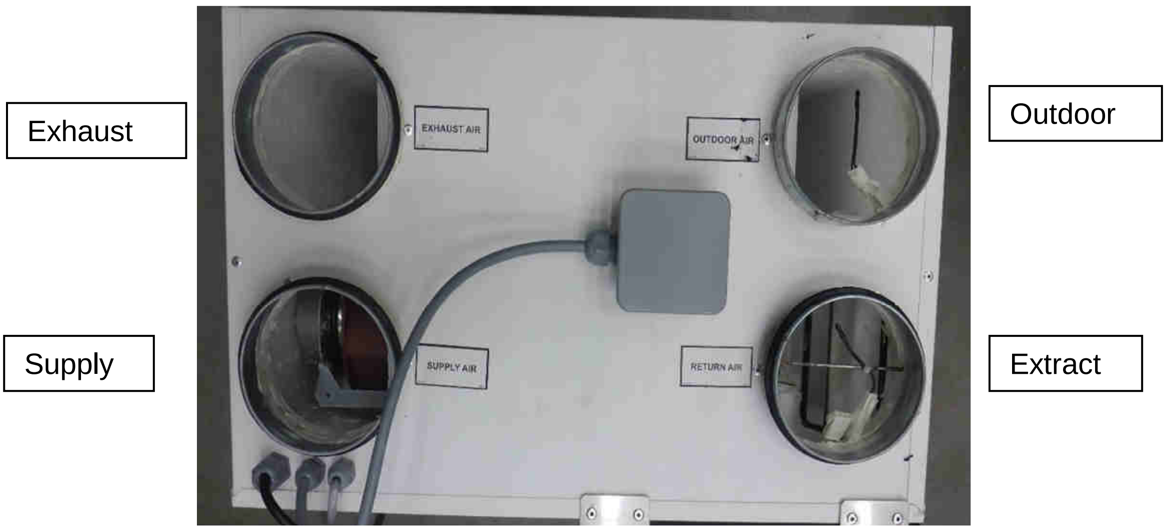

Figure A-2: View from the top of the ventilation unit

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Images of the test sample

Figure A-3: View of the rear side of the ventilation unit

Figure A-4: View of bottom of the ventilation unit

Images of the test sample

Figure A-5: View of ventilation unit with opened filter cover

Figure A-6: extract air / outdoor air filter (class G4) of the ventilation unit

Images of the test sample

Figure A-7: View of the ventilation unit without front cover

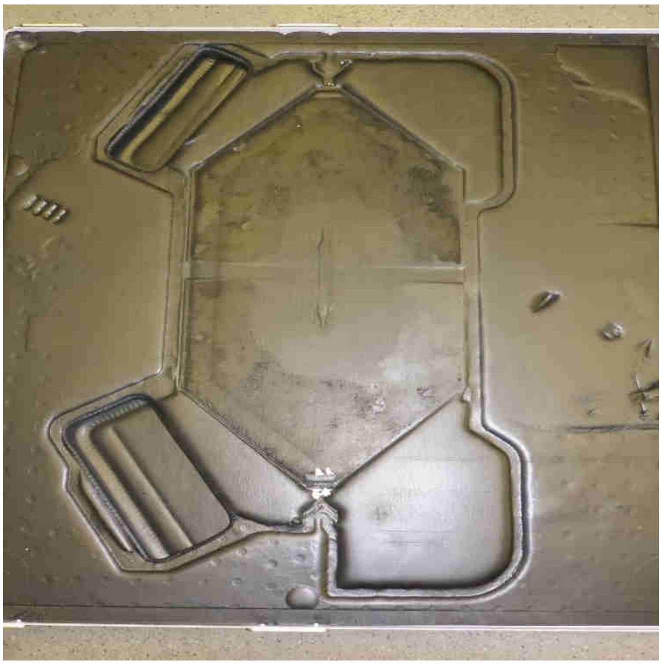

Figure A-8: View of the front cover

Images of the test sample

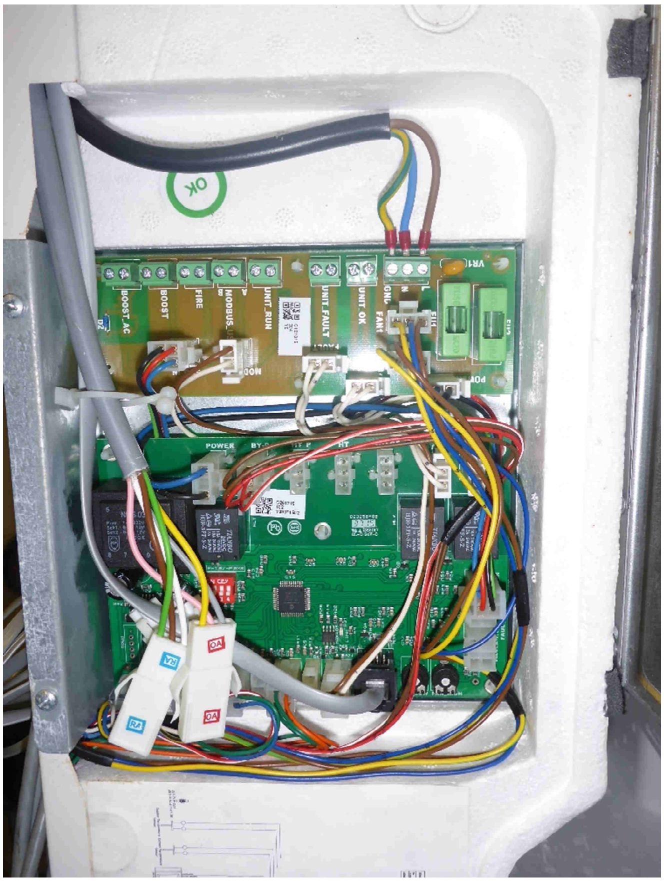

Figure A-9: Electric of the central ventilation unit

Figure A-10: Type plate of one of the fans of the ventilation unit

Images of the test sample

Figure A-11: Supply fan of the ventilation unit

Figure A-12: Exhaust fan of the ventilation unit

Images of the test sample

Figure A-13: Heat recovery cell of the central ventilation unit

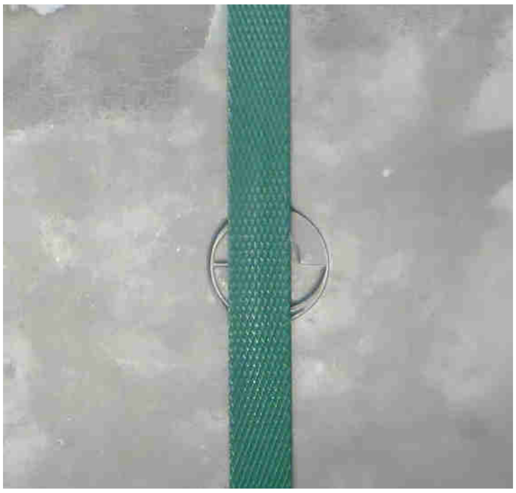

Figure A-14: Type plate of the heat recovery cell

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Images of the test sample

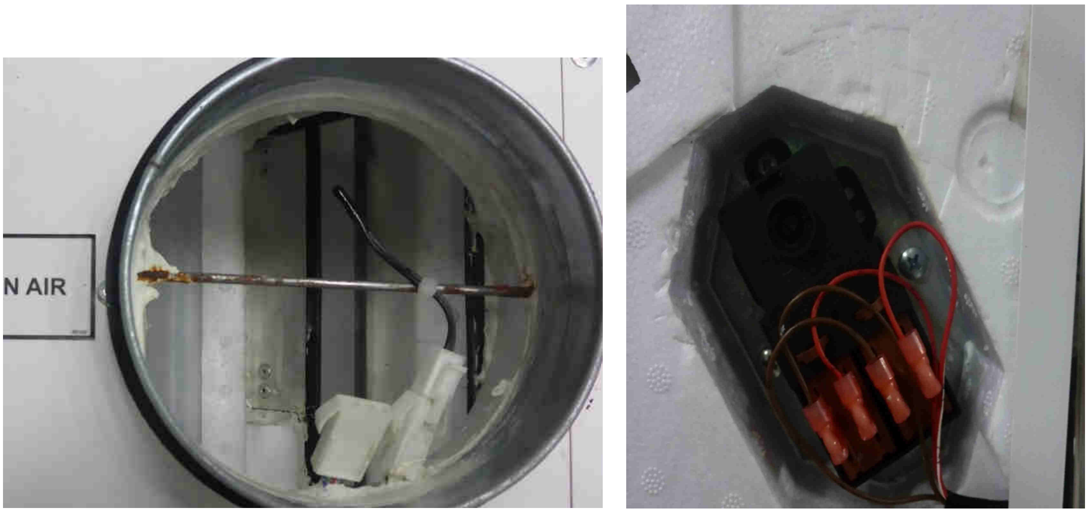

Figure A-15: Bypass of the ventilation unit (closed)

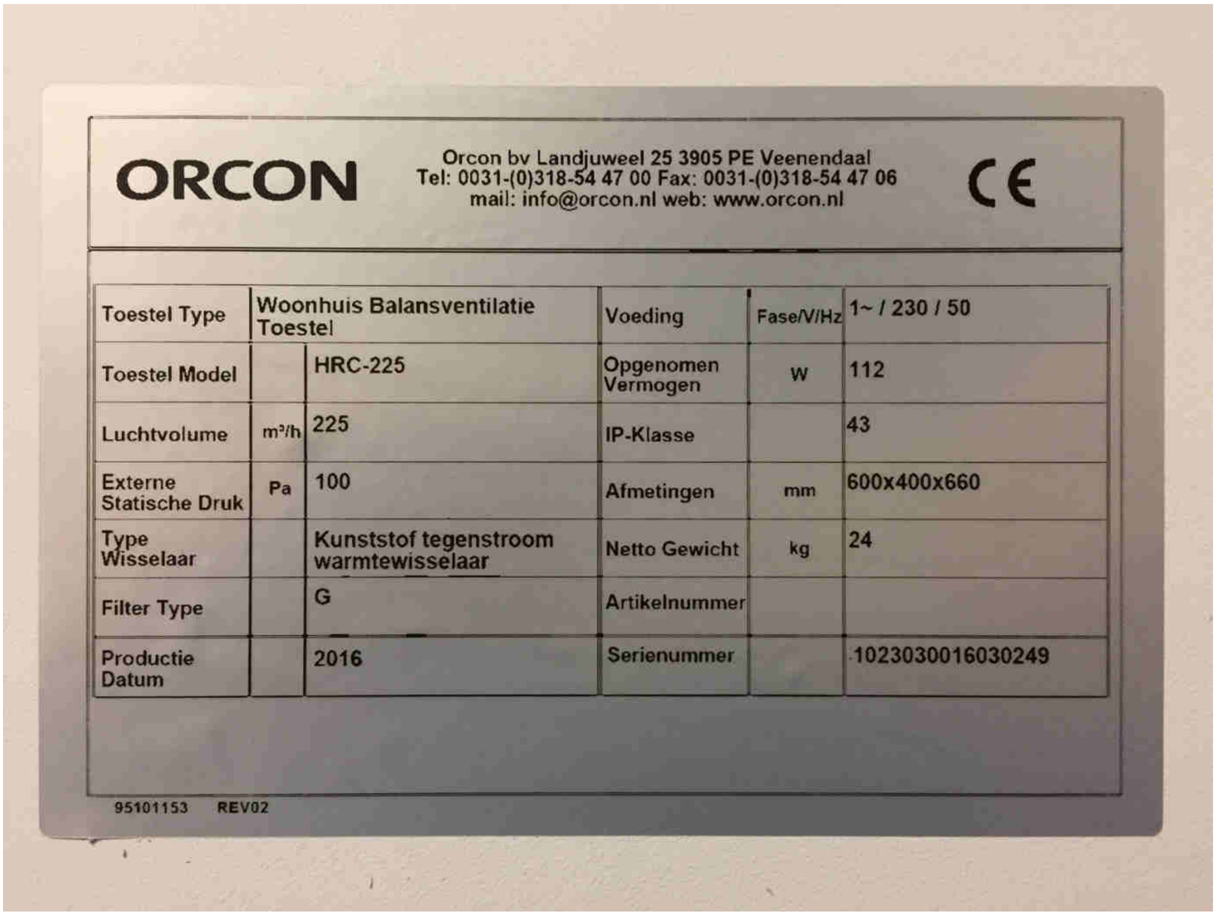

Figure A-16: Type plate of the central ventilation unit

Images of the test sample

Figure A-17: Basic Panel Control unit of the ventilation unit

Figure A-18: Pro Panel Control unit of the ventilation unit

Images of the test sample

Figure A-19: Optional control unit of type “15 RF”

Figure A-20: Optional control unit of type “15 RF” with CO_2 sensor

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Data pertaining to the tested unit

Specifications according to ventilation unit's type plate

Manufacturer:	ORCON bv
Type:	HRC-225
Address of the company:	Landjuweel 25 3905 PE Veenendaal / Nederlands
Voltage:	230 V / 50 Hz
Total Power consumption:	112 W
Current consumption:	-- A
Serial number:	1023030016030249
Product number:	---
Year of production:	2016
Weight:	24 kg

Dimensions of the ventilation unit

	Test laboratory indications
Width	598 mm
Height	660 mm
Depth	403 mm

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Data pertaining to the tested unit

Filter

Type	Quantity	Filter class	Dimensions
Outdoor air filter:	1	G4	365 mm x 150 mm x 10 mm
Extract air filter:	1	G4	365 mm x 150 mm x 10 mm

Fans

Exhaust fan

Quantity:	1
Design:	radial
Manufacturer:	ebm-papst
Type:	R3G133-AE07-18
Voltage/Frequency:	200 – 240 V 50/60 Hz
Current consumption:	0.46 A
Real power consumption:	50 W
Speed:	4320 $^{1}/_{min}$

Supply fan

Quantity:	1
Design:	radial
Manufacturer:	ebm-papst
Type:	R3G133-AE07-18
Voltage/Frequency:	200 – 240 V 50/60 Hz
Current consumption:	0.46 A
Real power consumption:	50 W
Speed:	4320 $^{1}/_{min}$

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Data pertaining to the tested unit

Heat exchanger

Quantity:	1
Design:	cross counter flow
Material:	plastic
Manufacturer:	Klingenburg
Type:	-
Serial No.:	-
Humidityrecovery:	No

Dimensions:	Width	230 mm
	Length 1	450 mm
	Length 2	245 mm
	Depth	350 mm

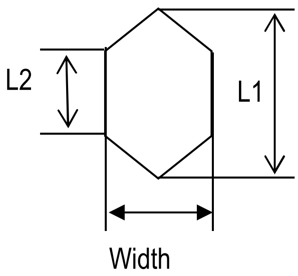

Plate spacing	4.2 mm

Air connections

Extract air:	∅ DN 125
Exhaust air:	∅ DN 125
Outdoor air:	∅ DN 125
Supply air:	∅ DN 125

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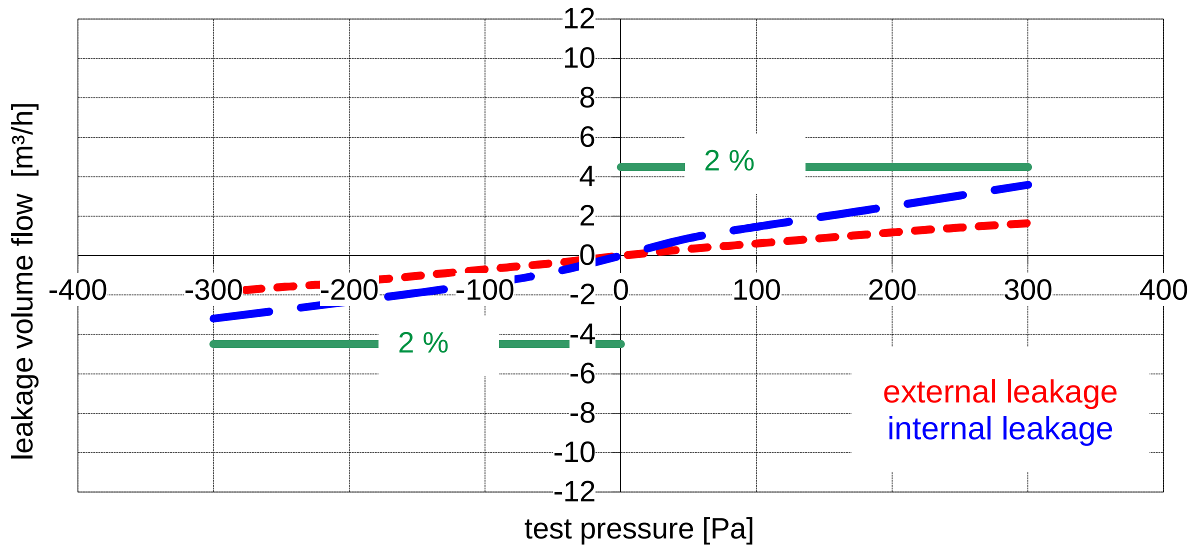
Results of the tightness test

The leakage related to the maximum declared air volume flow of 224 m³/h is:

		external leakage		internal leakage	
Measurement	P_{stat}	**leakage volume flow**	**leakage**	**leakage volume flow**	**leakage**
Nr.	[Pa]	[m³/h]	%	[m³/h]	%
1	-300.0	1.9	0.8	3.2	1.4
2	**-250.0**	**1.6**	**0.7**	-	-
3	-200.0	1.3	0.6	2.3	1.0
4	**-100.0**	0.7	0.3	**1.4**	**0.6**
5	-50.0	0.4	0.2	0.8	0.4
6	0.0	0.0	0.0	0.0	0.0
7	50.0	0.3	0.2	0.9	0.4
8	**100.0**	0.6	0.3	**1.5**	**0.7**
9	200.0	1.2	0.5	2.5	1.1
10	**250.0**	**1.4**	**0.6**	-	-
11	300.0	1.7	0.7	3.6	1.6



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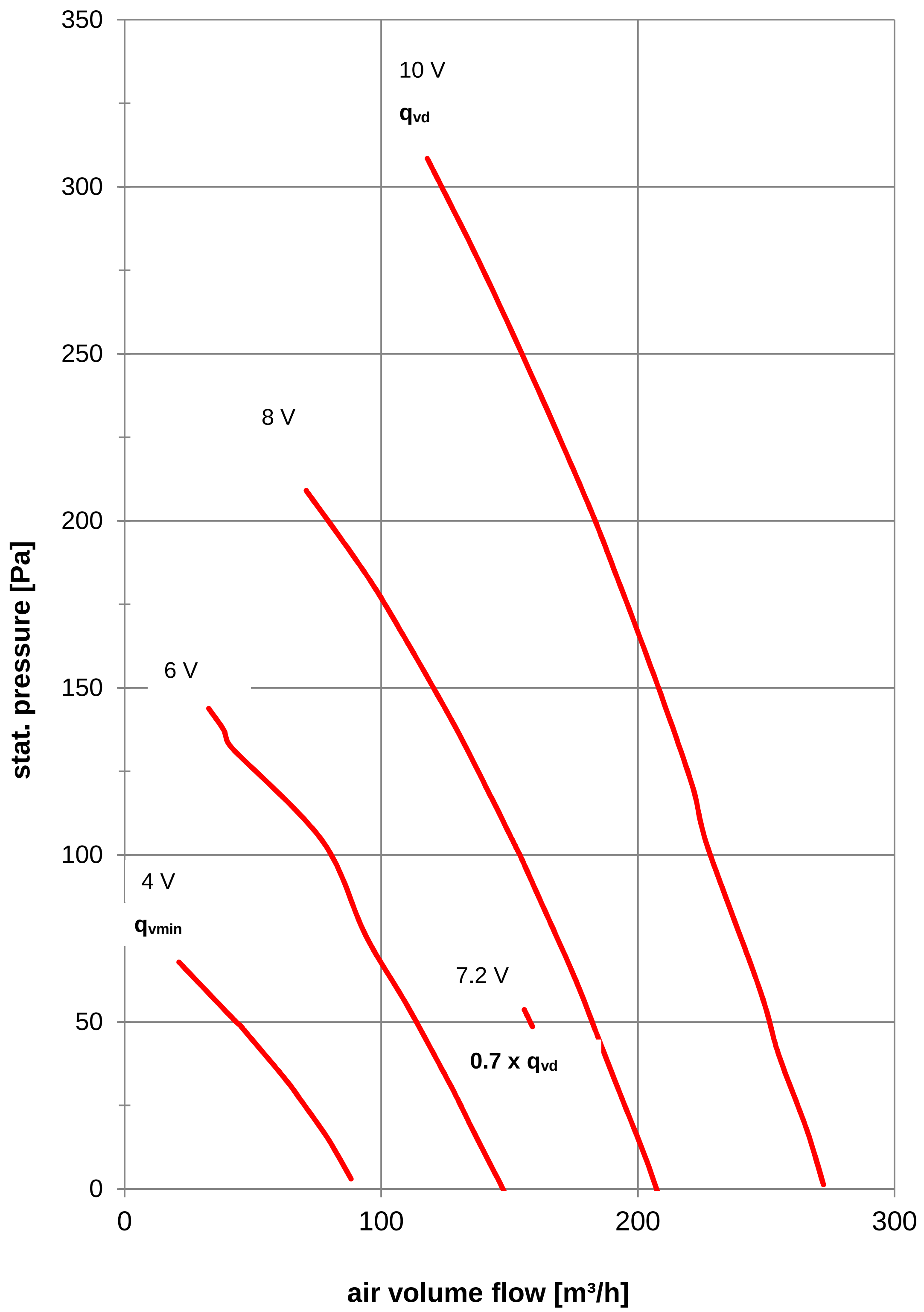
Pressure-airflow curves (extract air)

ρ = 1.2 kg/m³



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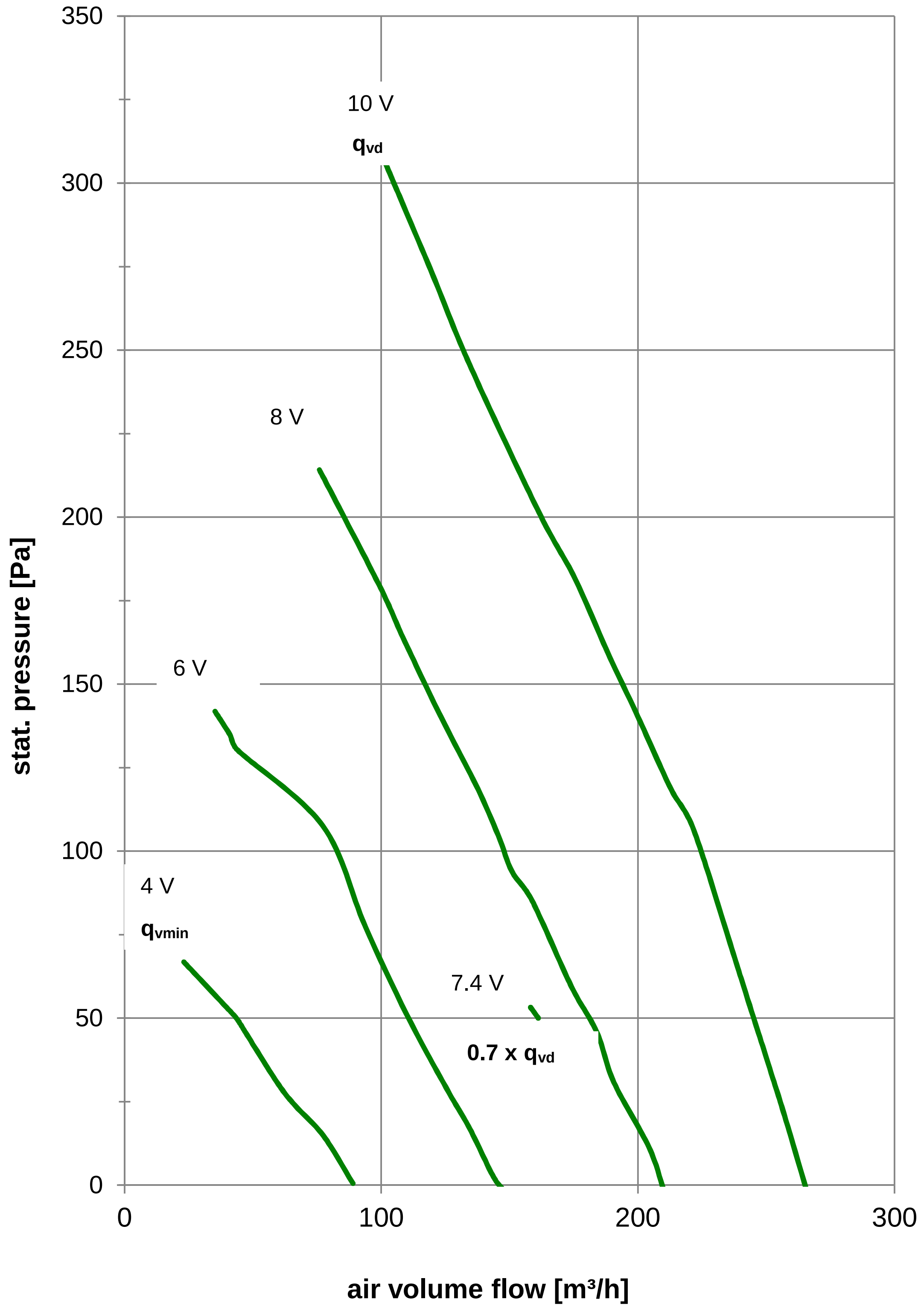
Pressure-airflow curves (supply air)

ρ = 1.2 kg/m³



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Measurements from the ventilation test

- **q_{vmin}** with the parameter: 4.0 V at the supply fan and 4.0 V at the exhaust fan

	p stat. SU-OU	$\dot{V}$	p stat. EXT-EXH	$\dot{V}$	P_{el}		spec. el. power input p_{el} [3]	
	ρ = 1.2 kg/m³ [Pa]	SU [m³/h]	ρ = 1.2 kg/m³ [Pa]	EXT [m³/h]	[W]	ρ = 1.2 kg/m³ [W]	[W/(m³/h)]	ρ = 1.2 kg/m³ W/(m³/h)]
1	0.6	89.0	3.1	88.2	19.5	21.0	0.22	0.24
2	14.9	77.4	14.9	79.3	19.6	21.1	0.25	0.27
3	24.0	66.3	26.6	68.7	19.2	20.5	0.29	0.31
4	31.2	59.1	33.9	61.5	19.1	20.5	0.32	0.35
5	46.4	46.6	46.8	47.4	18.7	20.0	0.40	0.43
6	49.2	44.3	48.9	45.1	18.5	19.9	0.42	0.45
7	50.9	42.6	50.6	42.7	18.6	19.9	0.44	0.47
8	66.9	23.0	67.9	21.1	17.6	18.9	0.76	0.82

- **q_v** with the parameter: 6.0 V at the supply fan and 5.9 V at the exhaust fan

	p stat. SU-OU	$\dot{V}$	p stat. EXT-EXH	$\dot{V}$	P_{el}		spec. el. power input p_{el}	
	ρ = 1.2 kg/m³ [Pa]	SU [m³/h]	ρ = 1.2 kg/m³ [Pa]	EXT [m³/h]	[W]	ρ = 1.2 kg/m³ [W]	[W/(m³/h)]	ρ = 1.2 kg/m³ W/(m³/h)]
1	-1.8	148.2	-8.2	152.1	35.1	37.5	0.24	0.25
2	2.5	143.7	-2.3	148.9	35.3	37.7	0.25	0.26
3	17.0	134.5	18.0	135.4	35.2	37.6	0.26	0.28
4	29.5	125.1	30.7	127.2	34.7	37.0	0.28	0.30
5	51.2	109.8	54.8	110.2	33.9	36.2	0.31	0.33
6	77.6	93.6	75.9	93.9	33.8	36.1	0.36	0.39
7	107.7	77.1	104.2	77.0	31.5	33.6	0.41	0.44
8	130.3	43.9	132.4	41.3	29.4	31.3	0.67	0.71
9	134.8	41.0	137.1	38.8	29.3	31.2	0.71	0.76
10	141.9	35.1	143.9	32.7	28.8	30.7	0.82	0.87

- **$0{,}7xq_{vd}$** with the parameter: 7.4V at the supply fan and 7.2 V at the exhaust fan

	p stat. SU-OU	$\dot{V}$	p stat. EXT-EXH	$\dot{V}$	P_{el}		spec. el. power input p_{el}	
	ρ = 1.2 kg/m³ [Pa]	SU [m³/h]	ρ = 1.2 kg/m³ [Pa]	EXT [m³/h]	[W]	ρ = 1.2 kg/m³ [W]	[W/(m³/h)]	ρ = 1.2 kg/m³ W/(m³/h)]
1	50.1	161.1	48.7	158.9	52.7	56.6	0.33	0.35
2	53.3	158.1	53.7	155.7	52.6	56.5	0.33	0.36

[3] The specific power input of the ventilation unit was related to the supply air flow.
p_{el} = power input of the unit / supply air flow.

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Measurements from the ventilation test

- **q_v** with the parameter: 8.1 V at the supply fan and 7.9 V at the exhaust fan

	p stat. SU-OU	$\dot{V}$	**p stat.** EXT-EXH	$\dot{V}$	P_{el}		spec. el. power input p_{el} [3]	
	ρ = 1.2 kg/m³ **[Pa]**	**SU [m³/h]**	ρ = 1.2 kg/m³ **[Pa]**	**EXT [m³/h]**	**[W]**	ρ = 1.2 kg/m³ **[W]**	**[W/(m³/h)]**	ρ = 1.2 kg/m³ **W/(m³/h)]**
1	-1.9	210.2	-4.2	209.2	63.8	68.3	0.30	0.32
2	11.4	204.3	10.2	202.6	63.6	68.0	0.31	0.33
3	30.9	190.6	26.1	194.3	63.4	67.8	0.33	0.36
4	45.9	184.0	45.7	184.4	63.3	67.7	0.34	0.37
5	59.5	174.1	63.8	175.1	62.7	67.1	0.36	0.39
6	85.1	158.8	87.6	161.2	61.9	66.2	0.39	0.42
7	93.9	150.9	99.9	154.1	61.2	65.4	0.41	0.43
8	104.8	145.5	101.7	152.9	60.7	64.9	0.42	0.45
9	119.6	137.0	116.9	143.0	60.0	64.3	0.44	0.47
10	140.4	123.1	138.5	128.7	58.7	62.8	0.48	0.51
11	164.1	108.4	163.6	110.2	57.0	61.0	0.53	0.56
12	179.1	99.5	183.6	94.4	55.6	59.5	0.56	0.60
13	214.2	75.8	209.1	70.7	52.8	56.6	0.70	0.75

- **q_{vd}** with the parameter: 10.0 V at the supply fan and 10.0 V at the exhaust fan

	p stat. SU-OU	$\dot{V}$	**p stat.** EXT-EXH	$\dot{V}$	P_{el}		spec. el. power input p_{el}	
	ρ = 1.2 kg/m³ **[Pa]**	**SU [m³/h]**	ρ = 1.2 kg/m³ **[Pa]**	**EXT [m³/h]**	**[W]**	ρ = 1.2 kg/m³ **[W]**	**[W/(m³/h)]**	ρ = 1.2 kg/m³ **W/(m³/h)]**
1	-2.0	265.9	1.3	272.3	112.2	119.8	0.42	0.45
2	20.7	257.1	18.0	265.7	112.1	119.7	0.44	0.47
3	36.3	250.8	40.4	254.7	111.6	119.2	0.45	0.48
4	61.9	240.2	59.7	247.5	111.5	119.0	0.46	0.50
5	106.2	221.8	102.7	227.0	111.6	120.1	0.50	0.54
6	118.5	212.9	119.0	221.8	109.9	117.4	0.52	0.55
7	140.3	200.0	135.7	214.6	108.9	116.2	0.54	0.58
8	159.6	188.2	156.7	204.8	107.5	114.9	0.57	0.61
9	181.8	175.4	184.3	191.3	106.1	113.4	0.60	0.65
10	201.5	161.4	205.6	180.3	104.5	111.8	0.65	0.69
11	245.9	134.2	241.7	159.7	101.0	108.1	0.75	0.80
12	274.1	119.2	277.5	138.1	98.2	105.0	0.82	0.88
13	305.9	101.6	308.5	117.9	94.9	101.5	0.93	1.00

[3] The specific power input of the ventilation unit was related to the supply air flow.
p_{el} = power input of the unit / supply air flow.

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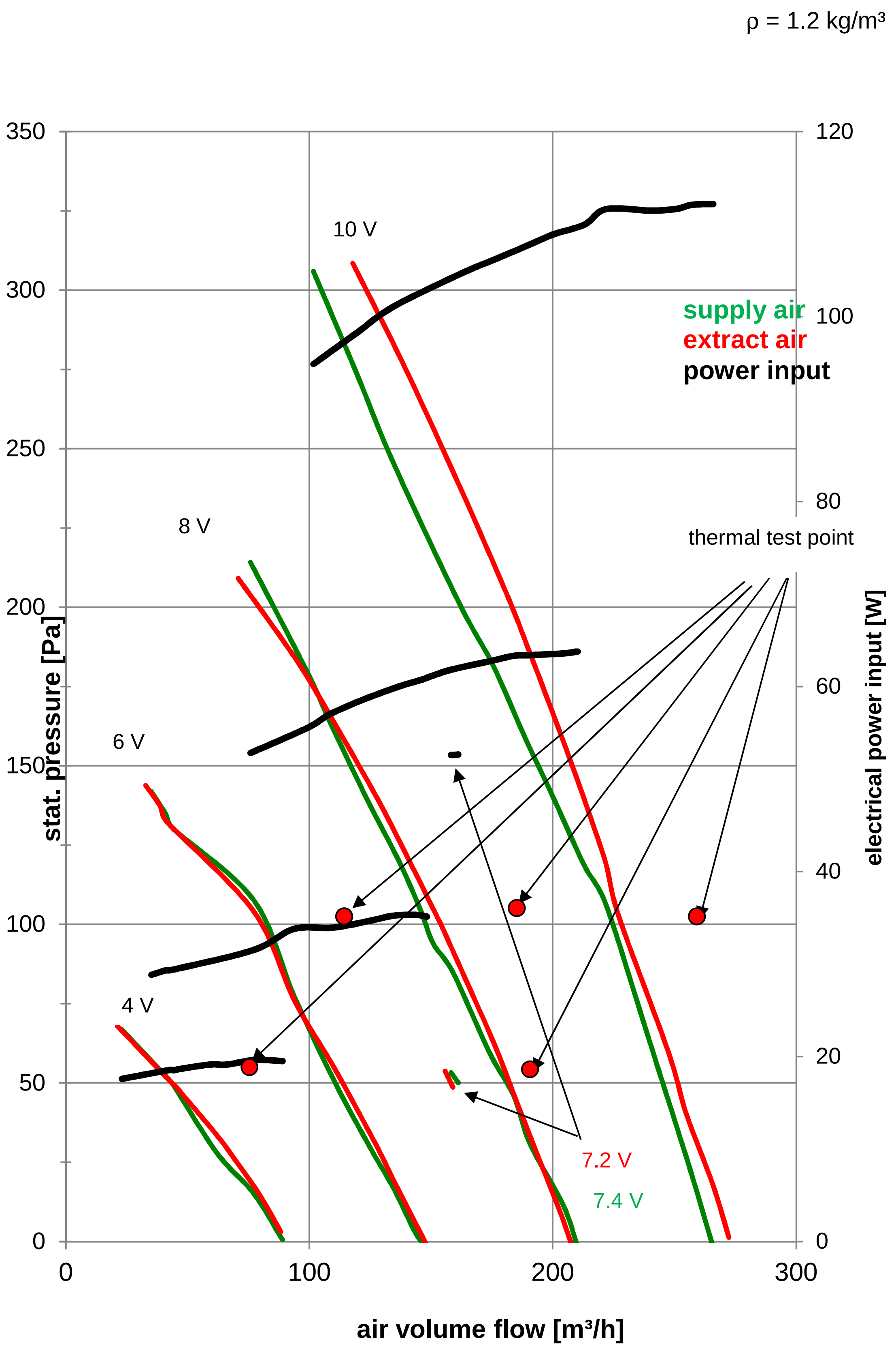
Thermodynamic test points



Industrie Service

Measurements and calculated values from the thermodynamic test

Calculation based on DIN EN 13141-7

Heatexchanger with humidity transfer	no		A7				
measured values			**q_{Vmin} 4 V**	**6 V**	**q_{Vn} 7.4 V**	**8 V**	**q_{Vd} 10 V**
temperature extract	**Θ_{11}**	**°C**	**19.9**	**20.2**	**20.1**	**20.0**	**20.2**
temperature exhaust	Θ_{12}	°C	10.9	10.3	10.2	10.4	10.8
temperature outdoor	**Θ_{21}**	**°C**	**6.9**	**7.0**	**6.9**	**7.0**	**7.0**
temperature supply	Θ_{22}	°C	19.1	19.0	18.6	18.8	18.6
rel. humidity extract	φ_{11}	%	39	39	39	39	39
rel. humidity exhaust	φ_{12}	%	69	74	74	73	71
rel. humidity outdoor	φ_{21}	%	76	86	87	86	85
rel. humidity supply	φ_{22}	%	34	39	40	39	39
abs. humidity extract	x_{11}	g/kg	5.93	6.03	6.00	6.00	5.97
abs. humidity exhaust	x_{12}	g/kg	5.92	6.04	6.04	6.04	6.04
abs. humidity outdoor	x_{21}	g/kg	4.93	5.65	5.67	5.61	5.59
abs. humidity supply	x_{22}	g/kg	4.95	5.65	5.63	5.58	5.51
wetbulb temperature extract	**Θw_{11}**	**°C**	**12.0**	**12.2**	**12.1**	**12.1**	**12.1**
wetbulb temperature outdoor	**Θw_{21}**	**°C**	**-**	**-**	**-**	**-**	**-**
volume flow extract	q_{V11}	m³/h	40	114	158	150	228
volume flow exhaust	q_{V12}	m³/h	40	111	153	145	220
volume flow outdoor	q_{V21}	m³/h	38	111	153	141	216
volume flow supply	q_{V22}	m³/h	40	114	157	149	225
mass flow extract	q_{m11}	kg/s	0.0127	0.0359	0.0499	0.0472	0.0719
mass flow exhaust	q_{m12}	kg/s	0.0129	0.0362	0.0500	0.0472	0.0718
mass flow outdoor	q_{m21}	kg/s	0.0127	0.0366	0.0504	0.0467	0.0713
mass flow supply	q_{m22}	kg/s	0.0126	0.0360	0.0499	0.0472	0.0713
pressure extract / exhaust	p_{tU1}	Pa	49	46	49	96	105
pressure outdoor / supply	p_{tU2}	Pa	50	46	48	96	98
ambient temperature	Θ_{amb}	°C	19.9	20.2	20.1	20.0	20.2
ambient pressure	p_{amb}	Pa	95,969	95,980	95,964	96,008	96,049
power input total	P_E	W	18.0	34.4	50.4	59.9	109.0

result			**q_{Vmin} 4 V**	**6 V**	**q_{Vn} 7.4 V**	**8 V**	**q_{Vd} 10 V**
mass flow ratio m_{SU}/m_{EXT}	$q_{m22/11}$	-	0.99	1.00	1.00	1.00	0.99
temperature ratio (supply)	$\eta_{\Theta SU}$	%	92.5	90.9	88.6	90.4	87.5
humidity ratio (supply)	η_{xSU}	%	-	-	-	-	-
temperature ratio (exhaust)	$\eta_{\Theta EX}$	%	70.8	74.5	74.5	74.2	71.6
humidity ratio (exhaust)	η_{xEX}	%	-	-	-	-	-
spec. electr. Power input related to (qV22)	P_E/q_{V22}	W/(m³/h)	0.45	0.30	0.32	0.40	0.48

The calculation is based on following constants:

$c_{p,L}$ [kJ/(kgK)]	$c_{p,D}$ [kJ/(kgK)]	r_0 [kJ/kg]	$c_{p,w}$ [kJ/(kgK)]
1.004	1.86	2500	4.18