Strojírenský zkušební ústav, s.p.
(Engineering Test Institute, Public Enterprise)
Hudcova 424/56b, Medlánky, 621 00 Brno, Česká republika
Testing Laboratory 1045.1 accredited by the CAI pursuant to ČSN EN ISO/IEC 17025:2018

L 1045.1

TEST REPORT
39-17904/H

Product:	Outdoor Air/Water Heat Pump - split
Type designation:	**VDS-100W/EN8BP+VDS-100B/EN8BP**
Customer:	Vidicon Sp. z o.o ul. Bema 7-9 50-265 Wrocław POLAND
Manufacturer:	Vidicon Sp. z o.o ul. Bema 7-9 50-265 Wrocław POLAND
Report issue date:	2024-09-25
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

I. Description of product tested

The Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** supplied by the company **Vidicon Sp. z o.o** is structurally adapted to operate in air/water system. Device is divided to the outdoor unit **VDS-100W/EN8BP**, placed outside on a pedestal and an indoor unit **VDS-100B/EN8BP**. Outdoor and indoor units are connected by copper piping and electrical wires. Refrigerant R32 is used with charge 1.6 kg. Power supply is a one-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with fixed flow rate.

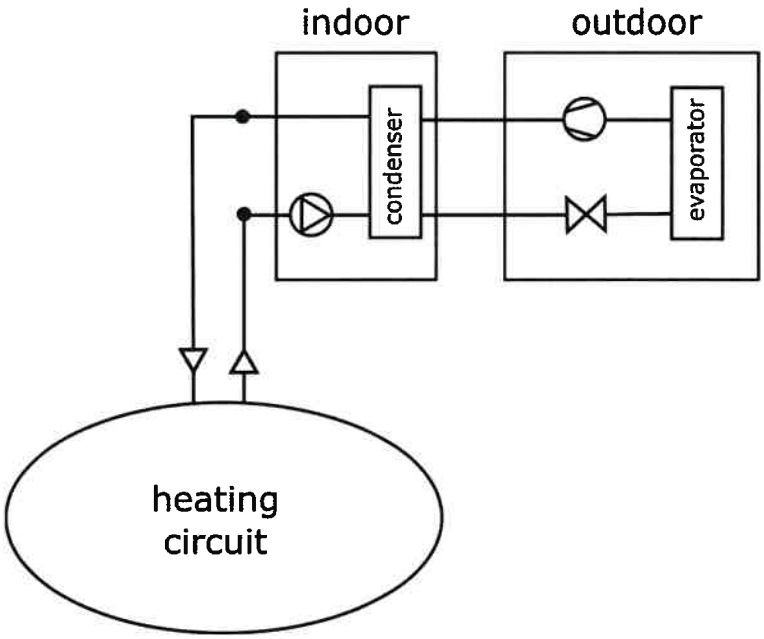
Main components of the outdoor unit **VDS-100W/EN8BP**:

- Serial number 820037000067AX24012301220324003
- cuboid shape with dimensions 980 × 395 × 810 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows and 1 of half length, dimensions 940 × 68 (45) × 760 mm (W × D × H), spacing 0.16 mm
- Compressor Mitsubishi Electric, SVB220FLGMC-L
- Refrigerant R32 (1.6 kg)
- Electric expansion valveSanhua DPF-.... coil Sanhua PQM10058
- 4-way reversing valve Sanhua, SHF-9H-35U-P
- Refrigerant accumulator Dongguan Qingxin'an Refrigeration Fittings Co., Ltd. KFR50WLB-16S
- Axial fan Ø 540 mm, electric motor Panasonic
- Pressure sensors
- Temperature sensors

Main components of the indoor unit **VDS-100B/EN8BP:**

- Serial number 820032000059AX24012301220324003
- Cuboid shape with dimensions 470 × 270 × 820 mm (W × D × H)
- Frame and casing made of varnished steel
- Plate condenser, dimensions 130 × 90 × 405 mm (W × D × H) including insulation
- Electric backup heater 3kW
- Circulation pump SHIMGE, APM25-9-130 PWM1
- Display
- Air vent
- Safety valve
- Temperature sensors
- Expansion vessel 5 l, Dongguan Qingxin'an Refrigeration Fittings Co., Ltd. PZG-005
- Flowswitch

Scheme:

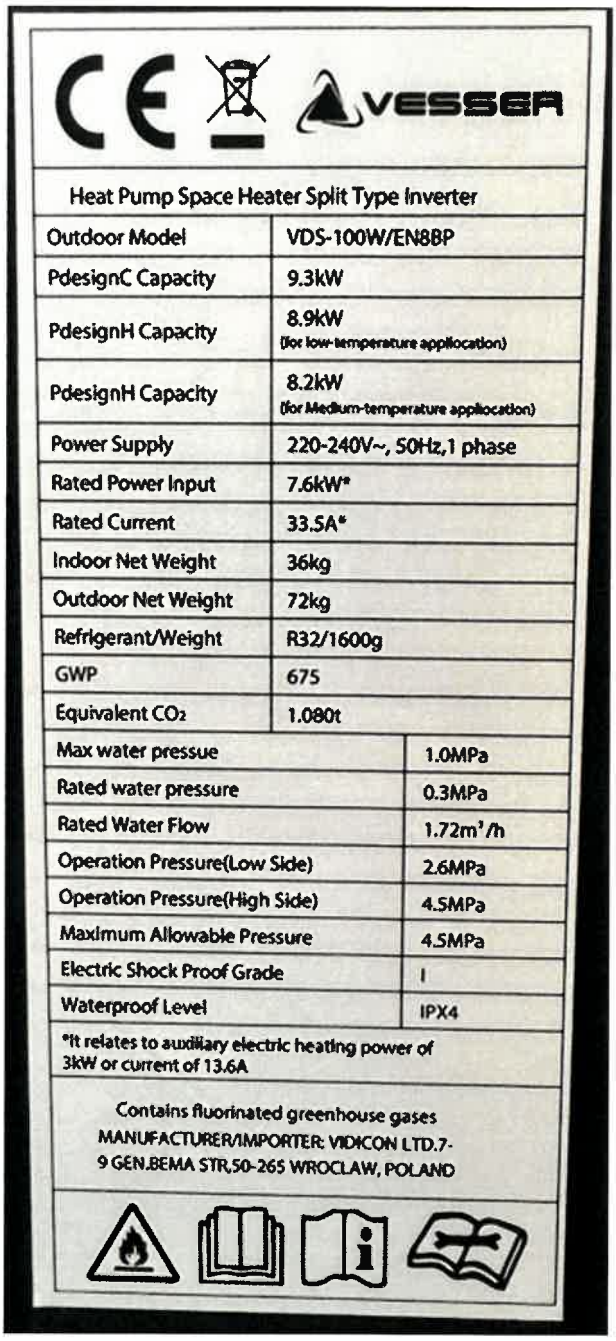


Photodocumentation:

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Front view –

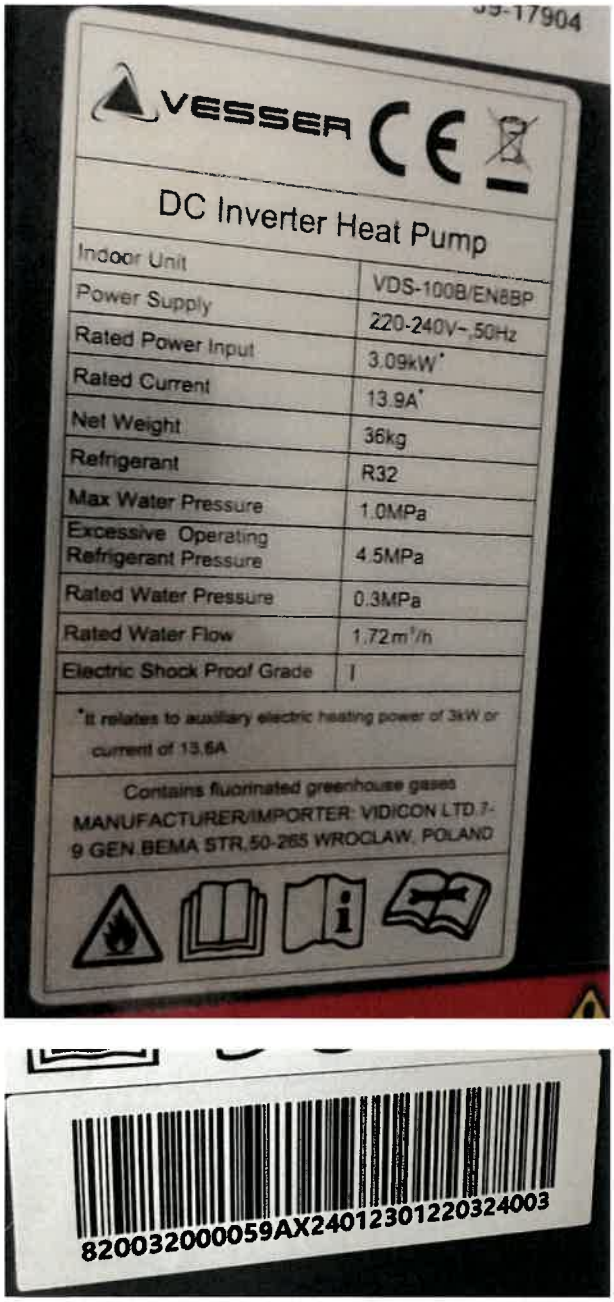
Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Back view –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Compressor label –



Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Label –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** –
outdoor unit
– Without cover –



Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** –
indoor unit
– Label –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – indoor unit
– With cover –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – indoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.40392.001 1212.24.40393.001	**VDS-100W/EN8BP+VDS-100B/EN8BP**	2024-08-12 2024-08-12

The visual inspection, tests and verification were carried out by Ing. Ondrej Bilkovič at the test station of SZU. The tests were performed using measuring and testing equipment with valid calibration.

III. Measuring and test equipment:

No.	Description	Inventory number
1.	Electrical energy meter	022370/1
2.	Digital watt meter	MaR01/EM01
3.	Flow meter Krohne Optiflux	022370/5
4.	Barometer	022370/7
5.	Differential pressure gauge	MaR01_TI
6.	Thermometers	022370/10
7.	Thermo-hydro meter 608-H1	117043
8.	Tape measure	ME 475
9.	Multi-analyser SINUS SoundBook MK2	000-000-000-875/1
10.	Microphone pair G.R.A.S. 40 AK, wind deflector	000-000-000-875/2
11.	Calibrator G.R.A.S. 42AG	000-000-000-875/3

IV. Methods, results of tests and verifications

No.	Test objective	Requirement	Method of test	Documentation	Test evaluation/ verification *
1.	Calculation of sound power level	Art. 9	**ČSN ISO 9614-2:1997**	Page No. 9-19	+
2.	Acoustic measurements – Sound power level	Art. 8	**ČSN EN 12102-1:2023**	Page No. 8-19	+

***) Evaluation / statement of conformity:**

+..... Requirement fulfilled
-..... Requirement not fulfilled
0 .....Not applicable
x .....Not evaluated

Note:
The stated extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient k=2, corresponding to the coverage certainty of 95% as regards standard classification.

If a statement of conformity is provided, the decision rule pursuant to ILAC-G8:09/2019, Art. 4.2.1 – binary statement for the simple acceptance rule shall apply.

Test objective:	Heating and cooling equipment
Exact name of the test procedure:	**2.136*** - Measurement of noise characteristics
Test method:	**ČSN EN 12102-1:2023; ČSN ISO 9614-2:1997**
Sample tested:	Air/Water Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP**
Measuring equipment used:	see Chapter III
Place of test:	Engineering Test Institute, Hudcova 424/56b, 621 00 Brno, CZ

Measurement uncertainty:

Measured quantity	**Unit**	**Uncertainty of measurement**	**Evaluation**
Liquid			
- temperature difference (dT)	[K]	± 0.15 K	fulfilled
- temperature inlet/outlet	[°C]	± 0.15 K	fulfilled
- volume flow	[m^3/s]	± 1 %	fulfilled
- static pressure difference	[kPa]	± 1 kPa (Δp ≤ 20 kPa) or ± 5 % (Δp > 20 kPa)	fulfilled
Air			
- dry bulb temperature	[°C]	± 0.2 K	fulfilled
- wet bulb temperature	[°C]	± 0.4 K	fulfilled
- volume flow	[m^3/s]	± 5 %	not applied
- static pressure difference	[Pa]	± 5 Pa (Δp ≤ 100 Pa) or ± 5 % (Δp > 100 Pa)	not applied
Refrigerant			
- pressure at compressor outlet	[kPa]	± 1 %	not applied
- temperature	[°C]	± 0.5 K	not applied
Concentration (in volume)			
- heat transfer medium	[%]	± 2	not applied
Electrical quantities			
- electric power	[W]	± 1 %	fulfilled
- voltage	[V]	± 0.5 %	fulfilled
- current	[A]	± 0.5 %	fulfilled
- electric energy	[kWh]	± 1 %	not applied
Compressor rotational speed	[min^{-1}]	± 0.5 %	not applied
The heating or cooling capacities measured on the liquid side shall be determined within a maximum uncertainty of 5 % independent of the individual uncertainties of measurement including the uncertainties on the properties of fluids.			fulfilled

Note:
Comment to abbreviated marking: e.g. A7/W55
A (air) 7 (input source air temperature in °C) / W (water), 55 (output heating water temperature in °C)

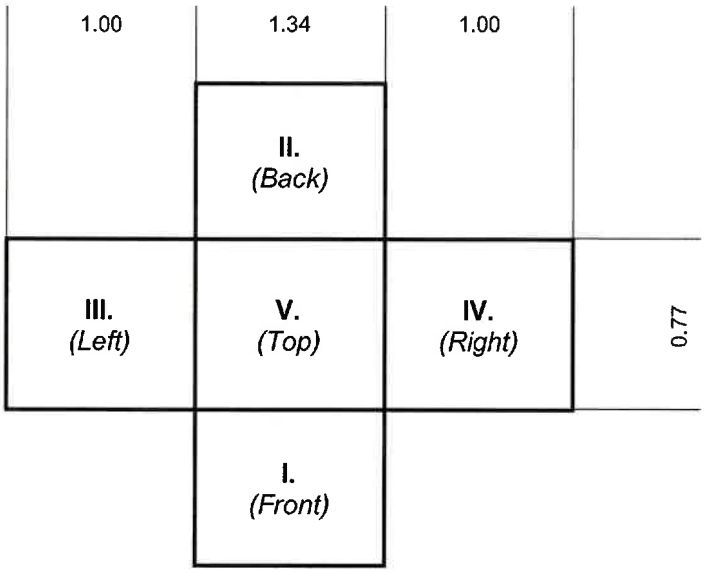
a) Measurement surface

Tested samples were surrounded by a cuboid-shaped measurement surface set at the distance *d* [m].

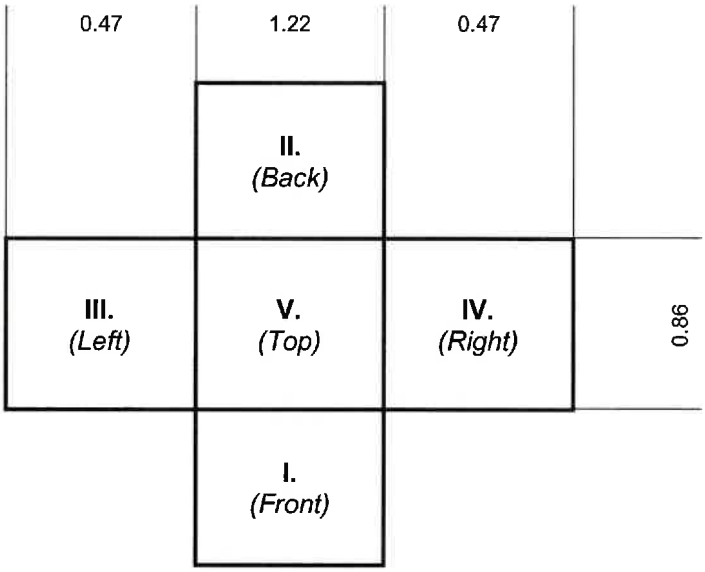
Test Sample: Air/Water Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP**			**Outdoor unit**	**Indoor Unit**
Distance from the test sample	*d*	[m]	0.20	0.20
Height of measurement surface	*h*	[m]	1.00	0.47
Width of measurement surface	*w*	[m]	1.34	1.22
Depth of measurement surface	*l*	[m]	0.77	0.86
Total measurement surface area	*S*	[m²]	5.25	3.00
Minimal measuring time per surface	t_M	[s]	90.00	90.00

Sketch of measurement surface (not to scale):

Air/Water Heat pump **VDS-100W/EN8BP**
– Outdoor unit –



Air/Water Heat pump **VDS-100B/EN8BP**
– Indoor unit –



b) Acoustic environment

The device under test was placed inside a climate chamber (dimensions shown below). The chamber was acoustically treated to be minimise room reverberation. The background noise was stable with the main noise source being the air conditioning of the climate chamber which was set to lower power or momentarily turned off for sufficient signal to noise ratio. The device under test was placed in a position offset from the middle of the chamber, at a sufficient distance from the surrounding walls, and was rotated by about 5÷10 °. Care was taken to ensure low air flow at the measurement surface by adjusting the measurement distance and positions.

Climate-acoustic chamber *(corresponds to free field over a reflecting plane)*			
Width of testing room	l_1	[m]	6.00
Length of testing room	l_2	[m]	4.00
Height of testing room	l_3	[m]	2.30

c) Measured and calculated data – General overview:

Test sample			Air/Water Heat pump **VDS-100W/EN8BP** -Outdoor unit-	Air/Water Heat pump **VDS-100B/EN8BP** -Indoor unit-
The measured values are in accordance with ČSN EN 12102-1:2023			YES	YES
The measured values are in accordance with ČSN EN ISO 9614-2:1997			YES	YES
Operation mode			Heating	Heating
Specification of the assessment condition			A7/W55*	A7/W55*
Type of HP capacity regulation			Inverter	Inverter
Compressor speed settings			26 Hz	26 Hz
Fan speed settings			AUTO	AUTO
Date of testing (YYYY-MM-DD)			2024-08-16	2024-08-16
Reference air temperature	t_{amb}	[°C]	7.0	28.5
Relative humidity of air	RH	[%]	86.8	52.7
Ambient pressure	p_{amb}	[hPa]	985.4	985.4
Overall sound power level (linear)	L_W	[dB]	63.4 ± 1.5	48.9 ± 1.5
Overall A-weighted sound power level	L_{WA}	**[dB(A)]**	**57.1 ± 1.5**	**41.3 ± 1.5**
Accuracy class			**Engineering (grade 2)**	

*) *Comment to abbreviated marking: i.e. A7/W55*
A (water), 7 (input source liquid temperature in °C) / W (water), 55 (outlet heating water temperature in °C)

1A) **Measurement results** – octave bands

Air/Water Heat pump **VDS-100W/EN8BP** Outdoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering (Grade 2)**

f_m	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_W	L_{WA}	U	Evaluation
[Hz]	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)}-L_{W(2)} \leq 5$		[dB]	[dB(A)]	[dB]	
125	26.8	3.2	YES	0.0	YES	YES	YES	60.2	44.2	± 3.0	passed
250	27.0	4.3	YES	0.0	YES	YES	YES	57.9	49.8	± 2.0	passed
500	**28.4**	**2.8**	**YES**	**0.0**	**YES**	**YES**	**YES**	**54.5**	**51.1**	**± 1.5**	**passed**
1000	21.4	2.9	YES	0.0	YES	YES	YES	50.7	50.7	± 1.5	passed
2000	20.8	2.9	YES	0.0	YES	YES	YES	47.1	48.2	± 1.5	passed
4000	20.2	3.5	YES	0.0	YES	YES	YES	47.5	48.5	± 1.5	passed
8000**)	20.0	3.9	YES	0.0	YES	YES	YES	45.6	45.5	± 2.5	passed
Total								**63.4**	**57.1**	**± 1.5**	

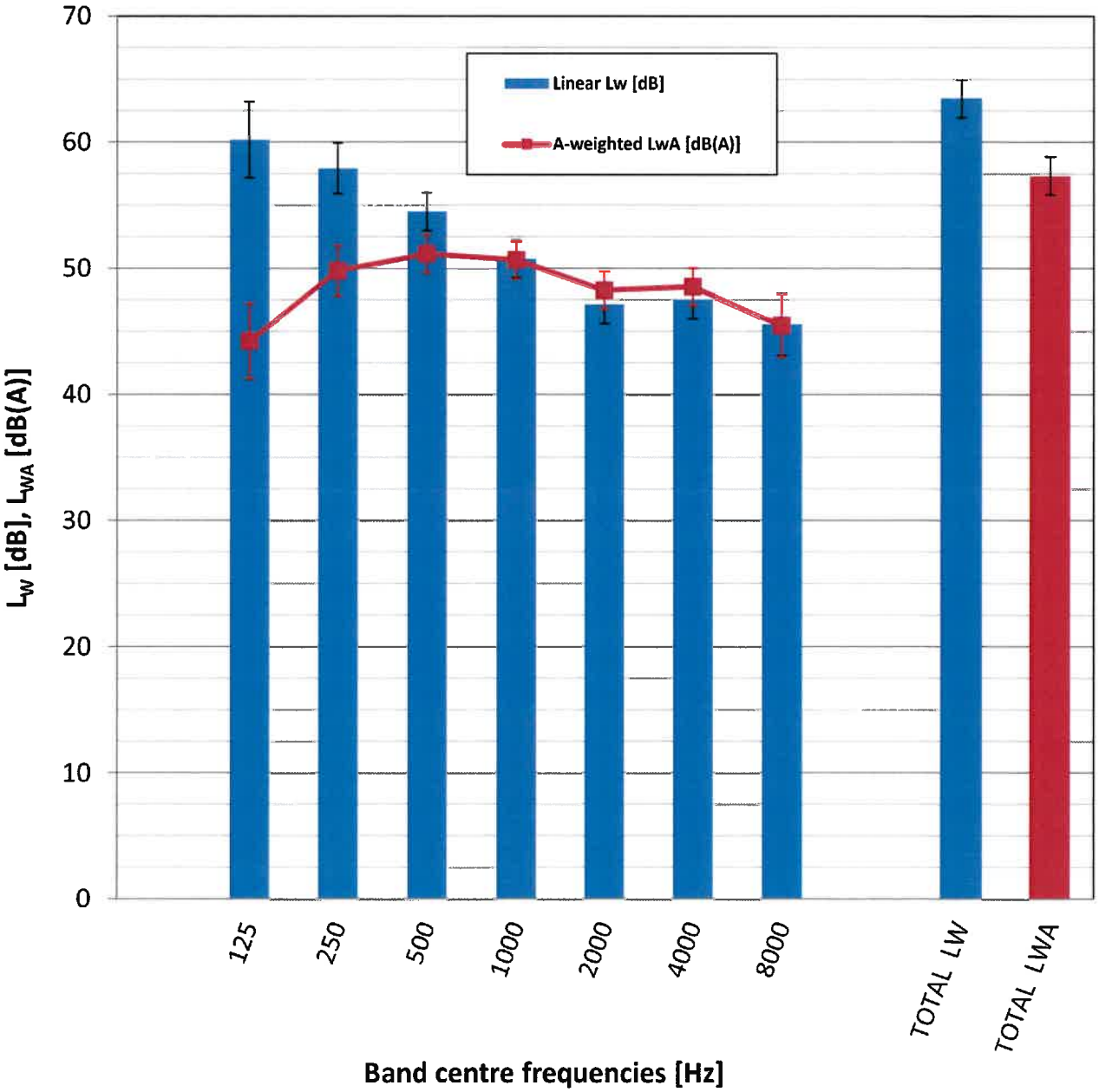
**) *Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.*

Legend:

passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is fulfilled in this band.*
not passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is not fulfilled in this band.*
c	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are evaluated in the calculation of L_{WA}.*
nc	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are not evaluated in the calculation of L_{WA}.*

Spectrum of Sound power level L_W – octave bands

Air/Water Heat pump **VDS-100W/EN8BP** Outdoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering** **(Grade 2)**



1B) Measurement results – one-third octave bands

Air/Water Heat pump **VDS-100W/EN8BP** Outdoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering (Grade 2)**

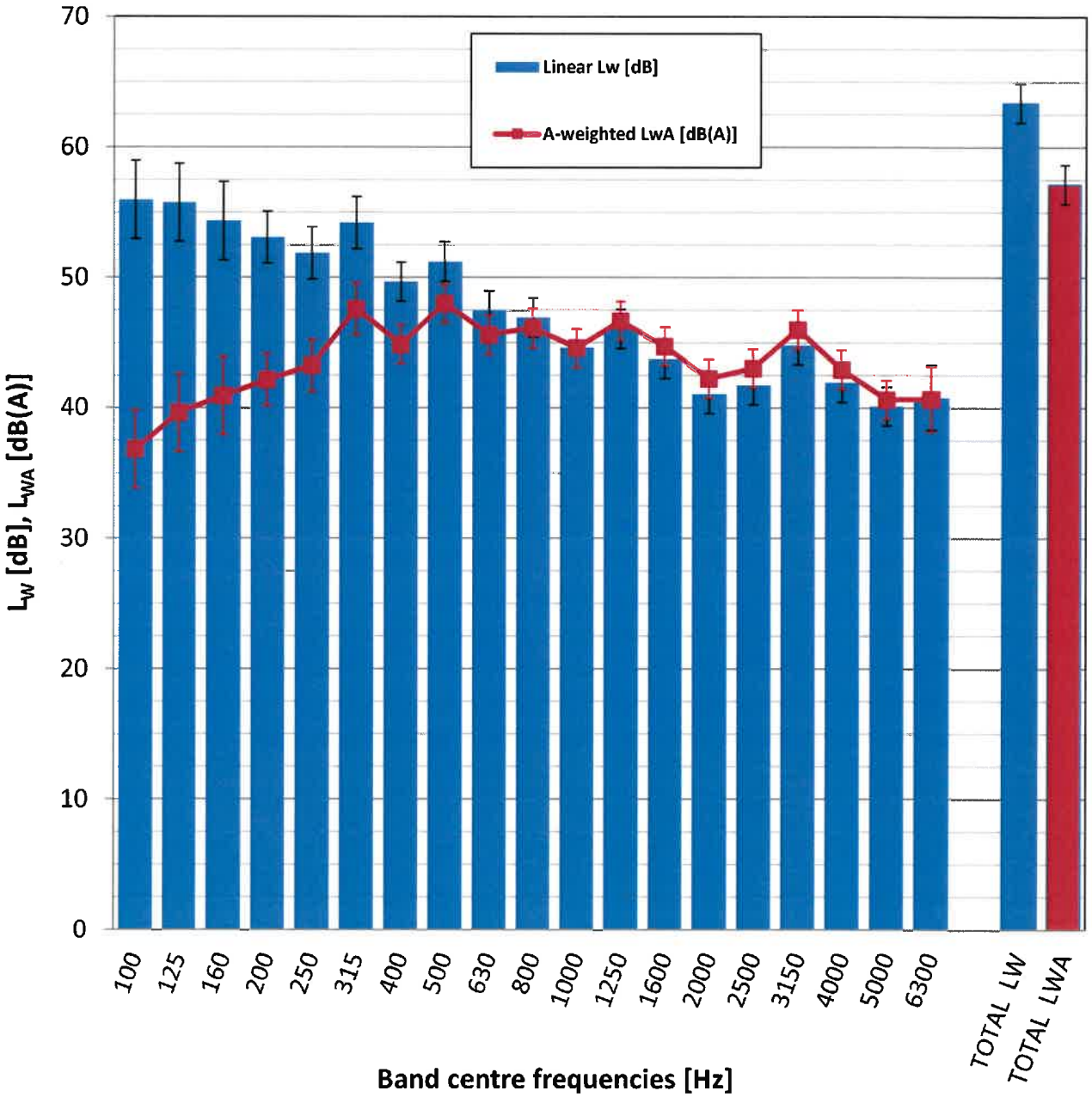
f_m	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_W	L_{WA}	U	Evaluation
[Hz]	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)}$-$L_{W(2)} \leq 5$		[dB]	[dB(A)]	[dB]	
100	27.0	3.3	YES	0.0	YES	YES	YES	56.0	36.9	± 3.0	c
125	26.8	3.2	YES	0.0	YES	YES	YES	55.7	39.6	± 3.0	passed
160	26.9	2.9	YES	0.0	YES	YES	YES	54.3	40.9	± 3.0	passed
200	27.0	4.7	YES	0.0	YES	YES	YES	53.1	42.2	± 2.0	passed
250	27.0	4.3	YES	0.0	YES	YES	YES	51.9	43.3	± 2.0	passed
315	27.6	3.0	YES	0.0	YES	YES	YES	54.2	47.6	± 2.0	passed
400	28.1	3.1	YES	0.0	YES	YES	YES	49.7	44.9	± 1.5	passed
500	**28.4**	**2.8**	**YES**	**0.0**	**YES**	**YES**	**YES**	**51.2**	**48.0**	**± 1.5**	**passed**
630	28.6	2.6	YES	0.0	YES	YES	YES	47.5	45.6	± 1.5	passed
800	20.9	2.6	YES	0.0	YES	YES	YES	46.9	46.1	± 1.5	passed
1000	21.4	2.9	YES	0.0	YES	YES	YES	44.6	44.6	± 1.5	passed
1250	21.2	3.0	YES	0.0	YES	YES	YES	46.1	46.7	± 1.5	passed
1600	21.1	2.8	YES	0.0	YES	YES	YES	43.8	44.8	± 1.5	passed
2000	20.8	2.9	YES	0.0	YES	YES	YES	41.1	42.3	± 1.5	passed
2500	20.4	3.3	YES	0.0	YES	YES	YES	41.7	43.0	± 1.5	passed
3150	20.4	3.7	YES	0.0	YES	YES	YES	44.8	46.0	± 1.5	passed
4000	20.2	3.5	YES	0.0	YES	YES	YES	41.9	42.9	± 1.5	passed
5000	20.0	4.6	YES	0.0	YES	YES	YES	40.1	40.6	± 1.5	passed
6300	20.0	3.9	YES	0.0	YES	YES	YES	40.8	40.7	± 2.5	passed
Total								**63.4**	**57.1**	**± 1.5**	

Legend:

passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is fulfilled in this band.*
not passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is not fulfilled in this band.*
c	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are evaluated in the calculation of L_{WA}.*
nc	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are not evaluated in the calculation of L_{WA}.*

Spectrum of Sound power level L_W – one-third octave bands

Air/Water Heat pump **VDS-100W/EN8BP** Outdoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering** **(Grade 2)**



2A) **Measurement results** – octave bands

Air/Water Heat pump **VDS-100B/EN8BP** Indoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering (Grade 2)**

f_m	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_W	L_{WA}	U	Evaluation
[Hz]	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)}$-$L_{W(2)} \leq s$		[dB]	[dB(A)]	[dB]	
125	20.2	4.1	YES	0.0	YES	YES	YES	44.4	27.9	± 3.0	c
250	**21.0**	**4.5**	**YES**	**0.0**	**YES**	**YES**	**YES**	**45.7**	**37.5**	**± 2.0**	**passed**
500	21.7	4.3	YES	0.0	YES	YES	YES	39.9	36.2	± 1.5	passed
1000	22.2	2.1	YES	0.0	YES	YES	YES	34.0	33.7	± 1.5	passed
2000	21.3	9.7	YES	0.0	YES	NO	NO	18.5	19.7	± 1.5	nc
4000	20.6	19.1	YES	2.5	YES	YES	YES	26.3	27.2	± 1.5	c
8000**)	20.3	20.1	YES	3.0	YES	NO	NO	21.9	21.8	± 2.5	nc
Total								**48.9**	**41.3**	**± 1.5**	

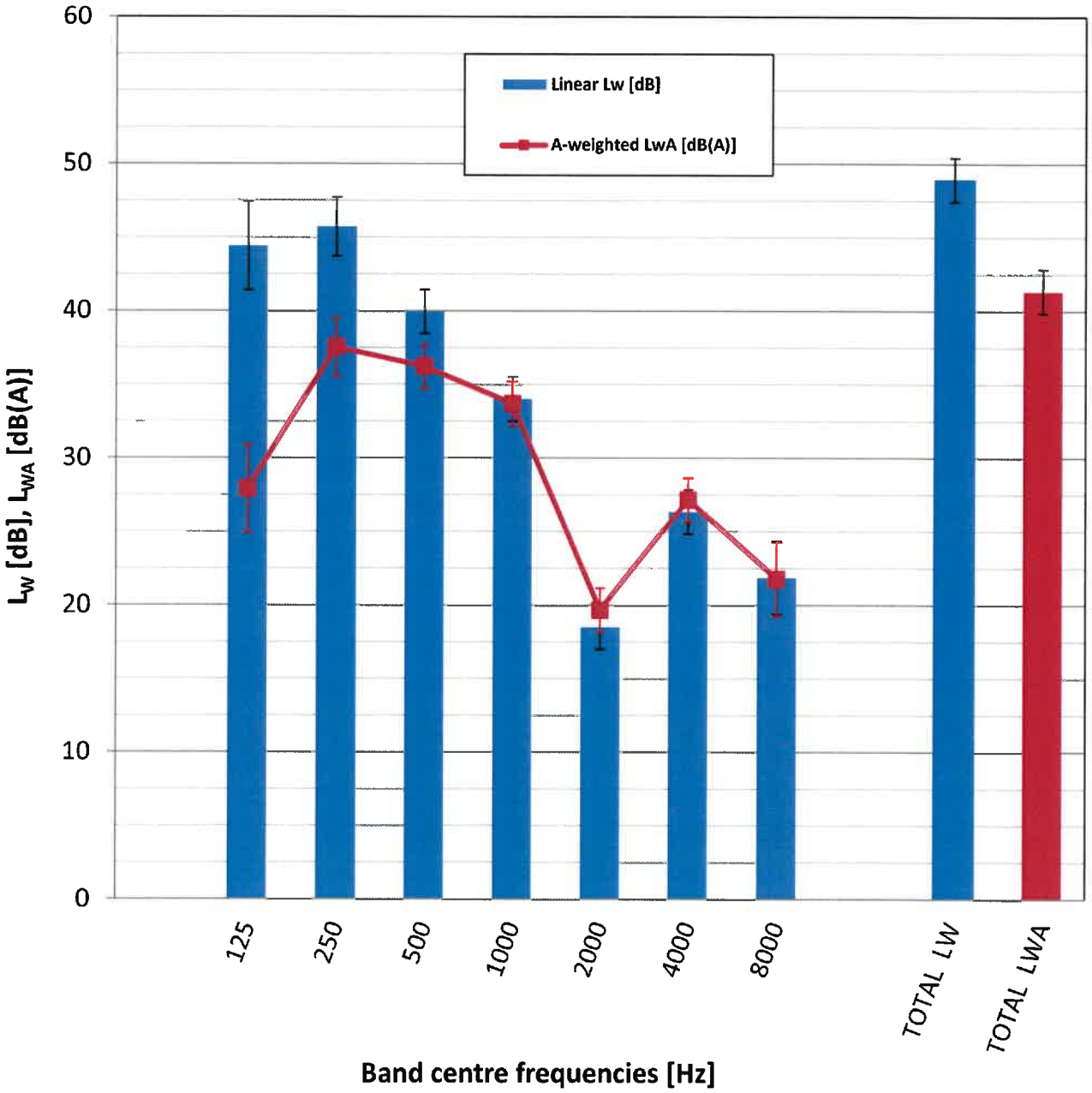
**) *Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.*

Legend:

passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is fulfilled in this band.*
not passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is not fulfilled in this band.*
c	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are evaluated in the calculation of L_{WA}.*
nc	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are not evaluated in the calculation of L_{WA}.*

Spectrum of Sound power level L_W – octave bands

Air/Water Heat pump **VDS-100B/EN8BP** Indoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering** **(Grade 2)**



2B) Measurement results – one-third octave bands

Air/Water Heat pump **VDS-100B/EN8BP** Indoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering (Grade 2)**

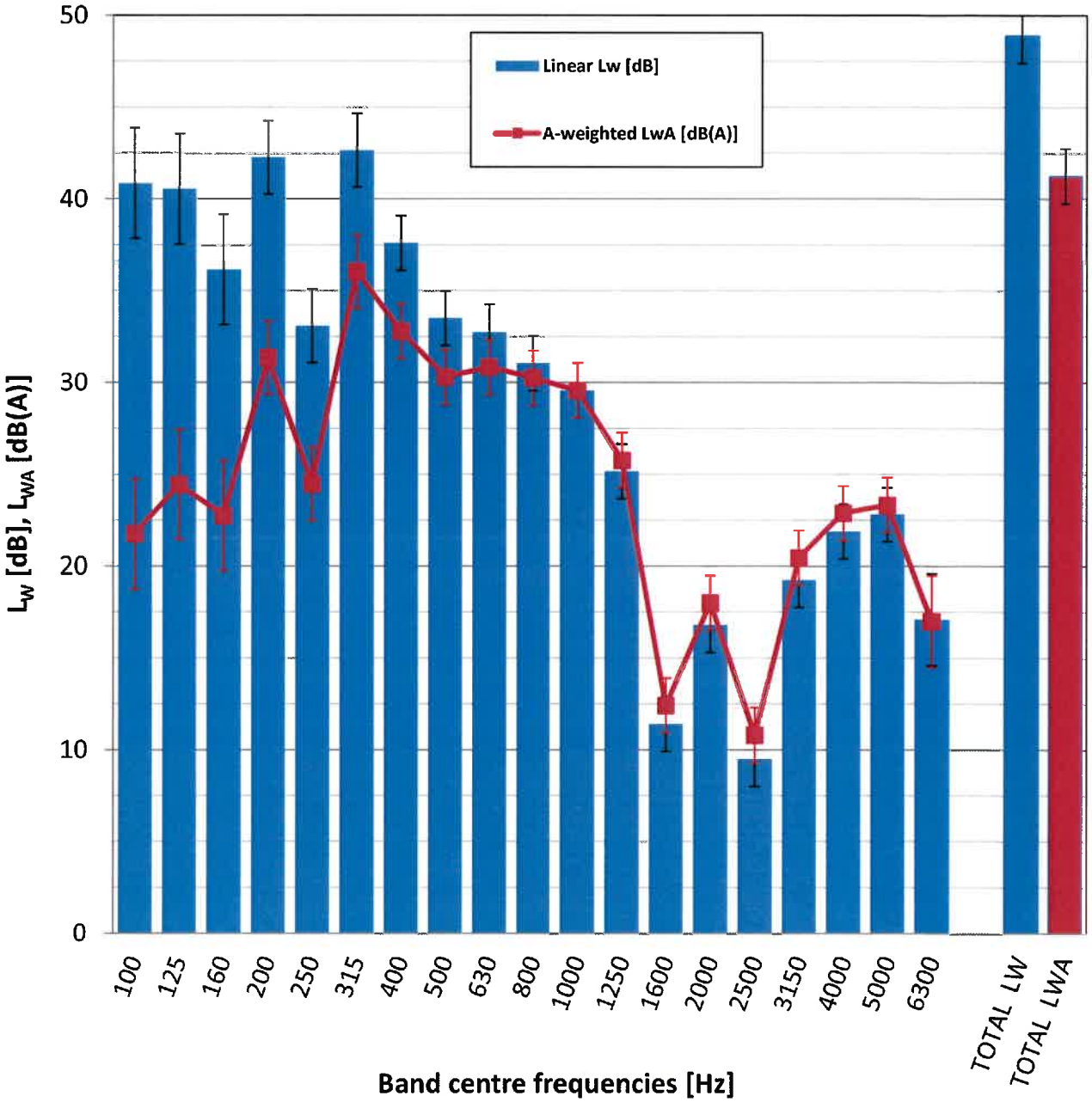
f_m	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_W	L_{WA}	U	Evaluation
[Hz]	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)}-L_{W(2)} \leq 5$		[dB]	[dB(A)]	[dB]	
100	20.5	5.0	YES	0.0	YES	YES	YES	40.9	21.8	± 3.0	c
125	20.2	4.1	YES	0.0	YES	YES	YES	40.6	24.5	± 3.0	c
160	20.3	3.4	YES	0.0	YES	YES	YES	36.2	22.8	± 3.0	c
200	20.6	2.6	YES	0.0	YES	YES	YES	42.3	31.4	± 2.0	passed
250	21.0	4.5	YES	0.0	YES	YES	YES	33.1	24.5	± 2.0	c
315	**21.1**	**3.2**	**YES**	**0.0**	**YES**	**YES**	**YES**	**42.7**	**36.1**	**± 2.0**	**passed**
400	21.6	2.8	YES	0.0	YES	YES	YES	37.6	32.8	± 1.5	passed
500	21.7	4.3	YES	0.0	YES	YES	YES	33.5	30.3	± 1.5	passed
630	21.7	0.0	YES	0.0	YES	YES	YES	32.7	30.8	± 1.5	passed
800	20.9	0.0	YES	0.0	YES	YES	YES	31.1	30.3	± 1.5	passed
1000	22.2	2.1	YES	0.0	YES	YES	YES	29.6	29.6	± 1.5	passed
1250	21.8	12.1	YES	2.9	YES	YES	YES	25.2	25.8	± 1.5	c
1600	21.6	14.2	YES	3.0	YES	NO	NO	11.4	12.4	± 1.5	nc
2000	21.3	9.7	YES	0.0	YES	NO	NO	16.8	18.0	± 1.5	nc
2500	20.8	17.7	YES	3.0	YES	NO	NO	9.5	10.8	± 1.5	nc
3150	20.5	18.2	YES	2.8	YES	YES	YES	19.3	20.5	± 1.5	c
4000	20.6	19.1	YES	2.5	YES	YES	YES	21.9	22.9	± 1.5	c
5000	20.1	18.7	YES	2.6	YES	YES	YES	22.8	23.3	± 1.5	c
6300	20.3	20.1	YES	3.0	YES	NO	NO	17.1	17.0	± 2.5	nc
Total								**48.9**	**41.3**	**± 1.5**	

Legend:

passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is fulfilled in this band.*
not passed	*Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA}. Required accuracy class is not fulfilled in this band.*
c	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are evaluated in the calculation of L_{WA}.*
nc	*Frequency bands with this description are not significant for the calculation of A-weighted total sound power level L_{WA}. These bands are not evaluated in the calculation of L_{WA}.*

Spectrum of Sound power level L_W – one-third octave bands

Air/Water Heat pump **VDS-100B/EN8BP** Indoor unit at A7/W55; Compressor at 26 Hz; Fan at AUTO	**Engineering** **(Grade 2)**



Tested by: Ing. Ondrej Bilkovič Date: 2024-09-25 Signed:

Reviewed and approved by: Ing. Antonín Kolbábek, Ph.D. Date: 2024-09-25 Signed:

V. A list of referenced documents

- Order of 2024-08-02 (Order reg. no. B-82633, received on 2024-07-10)
- Contract B-82633/39

- ČSN EN 12102-1:2023 - Air conditioners, liquid chilling packages, heat pumps, process chillers and dehumidifiers with electrically driven compressors - Determination of the sound power level - Part 1: Air conditioners, liquid chilling packages, heat pumps for space heating and cooling, dehumidifiers and process chillers
- ČSN ISO 9614-2:1997 - Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scannig

- ČSN EN 14511-2:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 2: Test conditions
- ČSN EN 14511-3:2024 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers with electrically driven compressors - Part 3: Test methods
- ČSN EN 14825:2023 - Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance

- Background of the SZU task no. 39-17904
- Record measurement file 39-17904-H.zip

Test Report compiled by: **Ing. Ondrej Bilkovič**
Test engineer

Test Report approved by: **Ing. Antonín Kolbábek, Ph.D.**
Hydraulic and Pressure Equipment Manager

– End of Test Report –

Testing Laboratory 1045.1 accredited by the Czech Accreditation Institute pursuant to
ČSN EN ISO/IEC 17025:2018
Strojírenský zkušební ústav, s.p. Zkušební laboratoř
(Engineering Test Institute, Public Enterprise, Testing Laboratory)
Hudcova 424/56b, Medlánky, 621 00 Brno

L 1045.1

TEST REPORT
39-17904/T

Product:	Outdoor Air/Water Heat Pump - split
Type designation:	**VDS-100W/EN8BP+VDS-100B/EN8BP**
Customer:	Vidicon Sp. z o.o ul. Bema 7-9 50-265 Wrocław POLAND
Manufacturer:	Vidicon Sp. z o.o ul. Bema 7-9 50-265 Wrocław POLAND
Report issue date:	2024-08-28
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

I. Description of product tested

The Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** supplied by the company **Vidicon Sp. z o.o** is structurally adapted to operate in air/water system. Device is divided to the outdoor unit **VDS-100W/EN8BP**, placed outside on a pedestal and an indoor unit **VDS-100B/EN8BP**. Outdoor and indoor units are connected by copper piping and electrical wires. Refrigerant R32 is used with charge 1.6 kg. Power supply is a one-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with fixed flow rate.

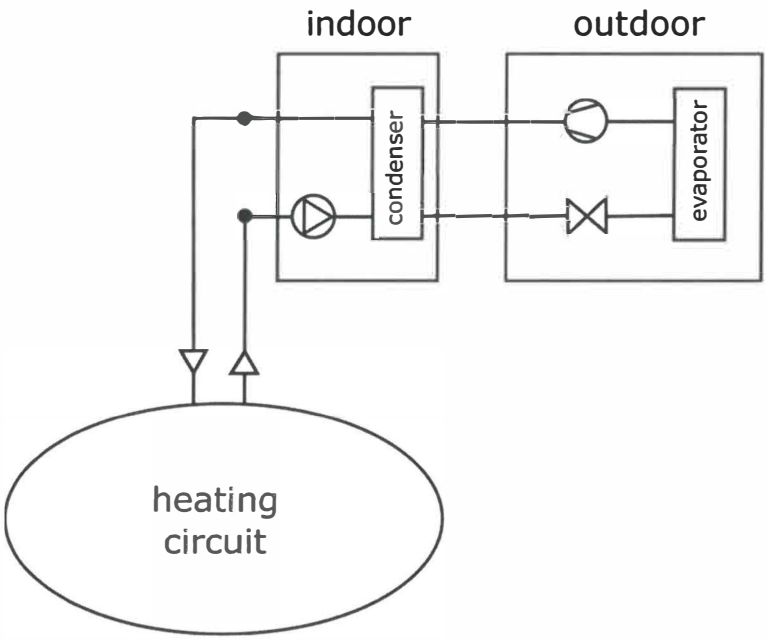
Main components of the outdoor unit **VDS-100W/EN8BP**:

- Serial number 820037000067AX24012301220324003
- cuboid shape with dimensions 980 × 395 × 810 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows and 1 of half length, dimensions 940 × 68 (45) × 760 mm (W × D × H), spacing 0.16 mm
- Compressor Mitsubishi Electric, SVB220FLGMC-L
- Refrigerant R32 (1.6 kg)
- Electric expansion valveSanhua DPF-…. coil Sanhua PQM10058
- 4-way reversing valve Sanhua, SHF-9H-35U-P
- Refrigerant accumulator Dongguan Qingxin'an Refrigeration Fittings Co., Ltd. KFR50WLB-16S
- Axial fan Ø 540 mm, electric motor Panasonic
- Pressure sensors
- Temperature sensors

Main components of the indoor unit **VDS-100B/EN8BP:**

- Serial number 820032000059AX24012301220324003
- Cuboid shape with dimensions 470 × 270 × 820 mm (W × D × H)
- Frame and casing made of varnished steel
- Plate condenser, dimensions 130 × 90 × 405 mm (W × D × H) including insulation
- Electric backup heater 3kW
- Circulation pump SHIMGE, APM25-9-130 PWM1
- Display
- Air vent
- Safety valve
- Temperature sensors
- Expansion vessel 5 l, Dongguan Qingxin'an Refrigeration Fittings Co., Ltd. PZG-005
- Flowswitch

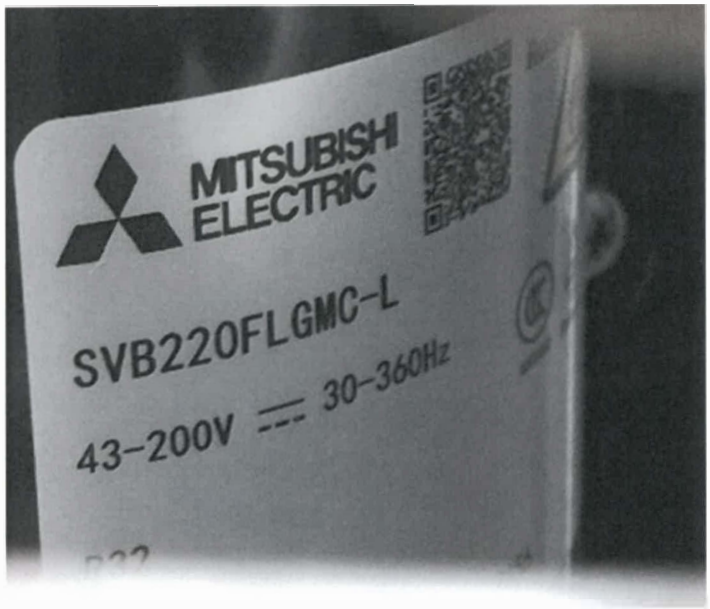
Scheme:



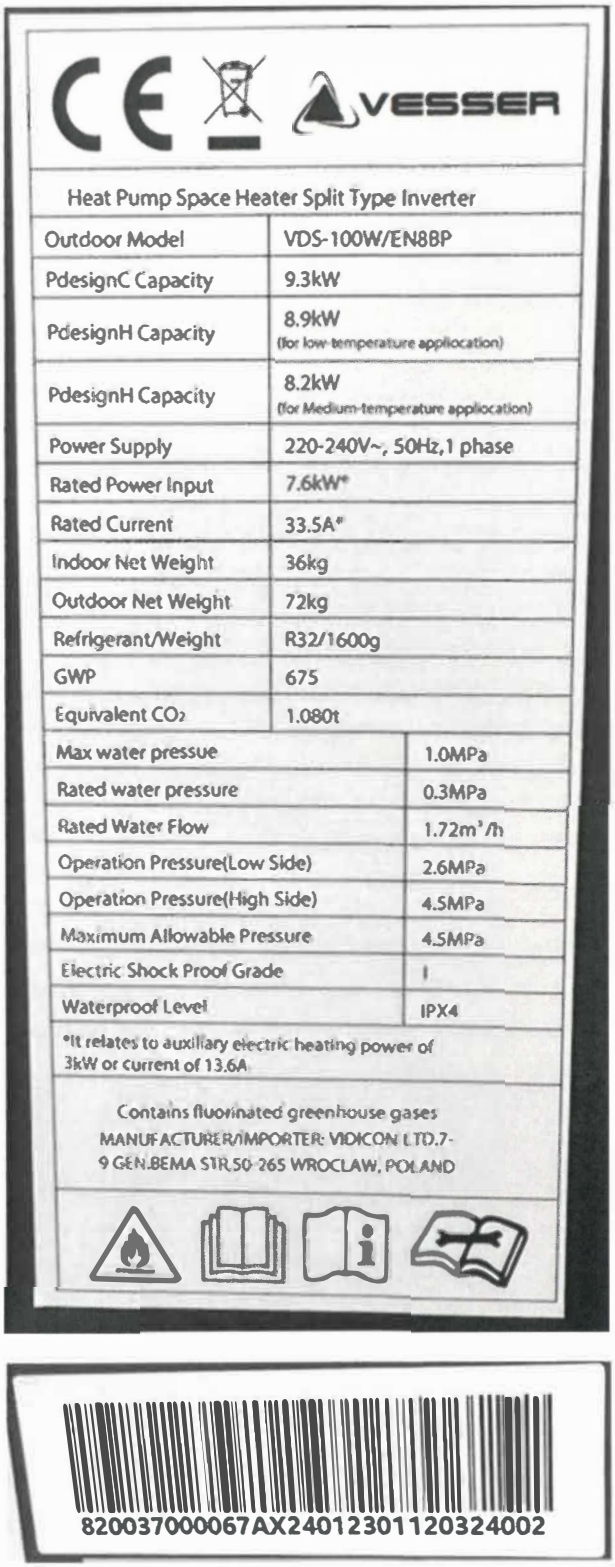
Photodocumentation:

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Front view –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Back view –

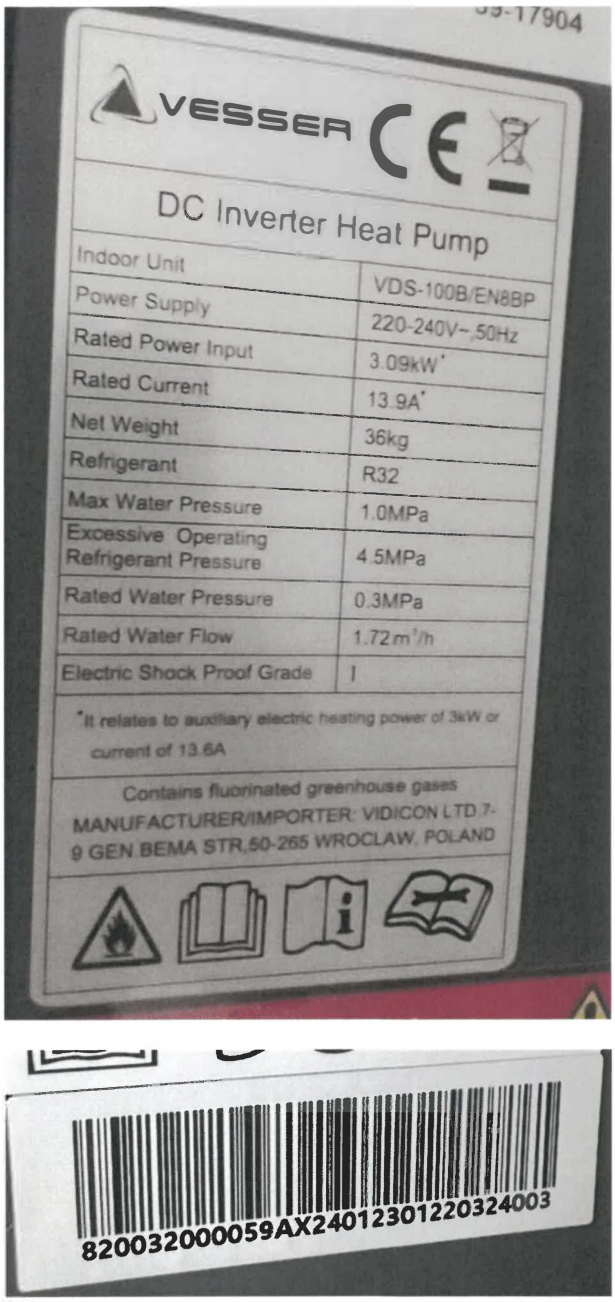


Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Compressor label –

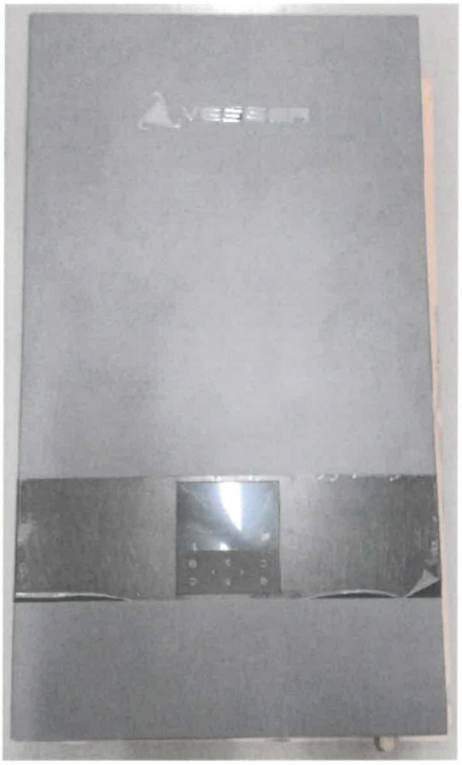


Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Label –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – outdoor unit
– Without cover –



Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – indoor unit
– Label –



Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – indoor unit
– With cover –

Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP** – indoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.40392.001 1212.24.40393.001	Outdoor Air/Water heat pump – split	2024-08-12 2024-08-12

The visual inspection, tests and verification were carried out by Ing. Dominik Šedivý, Ph.D. at the test station of SZU.
The tests were performed using measuring and testing equipment with valid calibration.

III. Measuring and test equipment:

No.	Description:	Inventory number:
1.	Electrical energy meter	022370/1
2.	Digital watt meter	MaR01/EM01
3.	Flow meter Krohne Optiflux	022370/5
4.	Barometer	022370/7
5.	Differential pressure gauge	MaR01_TI
6.	Temperature-humidity meter HC2-IC305	022370/10
7.	Temperature-humidity meter HC2-IC305	022370/11
8.	Thermometers	022370/13

IV. Methods, results of tests and verifications

No.	Test objective	Requirement	Method of test	Documentation	Test evaluation/ verification *
1.	Rating conditions	–	ČSN EN 14511-2:2023 ČSN EN 14511-3:2024	Page No. 10	x
2.	Seasonal performance tests and SCOP calculation – Low temperature application	–	ČSN EN 14511-3:2024 ČSN EN 14825:2023	Page No. 11 - 17	x
3.	Seasonal performance tests and SCOP calculation – Medium temperature application	–	ČSN EN 14511-3:2024 ČSN EN 14825:2023	Page No. 18 - 24	x
*) **Evaluation / statement of conformity:** +..... Requirement fulfilled -..... Requirement not fulfilled 0 .....Not applicable x .....Not evaluated					

Measured quantity	Unit	Uncertainty of measurement	Evaluation
Liquid			
- temperature difference (dT)	[K]	± 0.15 K	fulfilled
- temperature inlet/outlet	[°C]	± 0.15 K	fulfilled
- volume flow	[m3/s]	± 1 %	fulfilled
- static pressure difference	[kPa]	± 1 kPa (Δp ≤ 20 kPa) or ± 5 % (Δp > 20 kPa)	fulfilled
Air			
- dry bulb temperature	[°C]	± 0.2 K	fulfilled
- wet bulb temperature	[°C]	± 0.4 K	fulfilled
- volume flow	[m3/s]	± 5 %	not applied
- static pressure difference	[Pa]	± 5 Pa (Δp ≤ 100 Pa) or ± 5 % (Δp > 100 Pa)	not applied
Refrigerant			
- pressure at compressor outlet	[kPa]	± 1 %	not applied
- temperature	[°C]	± 0.5 K	not applied
Concentration (in volume)			
- heat transfer medium	[%]	± 2	not related
Electrical quantities			
- electric power	[W]	± 1 %	fulfilled
- voltage	[V]	± 0.5 %	fulfilled
- current	[A]	± 0.5 %	fulfilled
- electric energy	[kWh]	± 1 %	not applied
Compressor rotational speed	[min-1]	± 0.5 %	not applied

The heating or cooling capacities measured on the liquid side shall be determined within a maximum uncertainty of 5 % independent of the individual uncertainties of measurement including the uncertainties on the properties of fluids.	fulfilled

Note:
The stated extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient k=2, corresponding to the coverage certainty of 95% as regards standard classification.

If a statement of conformity is provided, the decision rule pursuant to ILAC-G8:09/2019, Art. 4.2.1 - binary statement for the simple acceptance rule shall apply.

Comment to abbreviated marking: e.g. A7/W35
A (air) 7 (input air, dry-bulb temperature in °C) / W (water), 35 (output heating water temperature in °C)

Test objective:	Rating conditions
Exact name of the test procedure:	**1.37* - Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions**
Test method:	ČSN EN 14511-2:2023, ČSN EN 14511-3:2024
Sample tested:	Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP**
Measuring equipment used:	see Chapter III

Specification of the assessment condition		**A7/W55**	**A7/W35**
Date of testing		**2024-08-12**	**2024-08-14**
Transient test procedure	YES / NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–
Average time of 1 cycle	[min]	–	–
Calculation time	[min]	70.0	70.0
Output heating water – temperature calculation	[°C]	55.02	35.04
Input heating water – temperature calculation	[°C]	47.02	30.02
Output heating water temperature	[°C]	55.02	35.04
Input heating water temperature	[°C]	47.02	30.02
Air temperature – dry bulb temperature	[°C]	6.98	7.03
Air temperature – wet bulb temperature	[°C]	5.97	6.07
Relative humidity	[%]	86.71	87.35
Barometric pressure	[kPa]	98.153	98.152
Ambient temperature	[°C]	20.37	20.77
Secondary circuit pressure difference	[kPa]	78.516	58.963
Efficiency of the secondary liquid pump	[–]	0.324	0.332
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	1.1809	1.7373
Density of heating water	$[kg \cdot m^{-3}]$	985.8	993.9
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.179	4.175
Voltage	[V]	230.48	230.67
Total current	[A]	17.88	10.06
Overall power input	[kW]	4.088	2.301
Capacity correction of sec. liquid pump	[W]	53.832	57.149
Power input correction of sec. liquid pump	[W]	79.59	85.60
Heating capacity – heating water	[kW]	10.842	10.046
Corrected heating capacity – heating water	**[kW]**	**10.788**	**9.989**
Uncertainty of corrected heating capacity	[kW]	± 0.117	± 0.171
Effective electric power input	**[kW]**	**4.008**	**2.215**
COP	**[–]**	**2.691**	**4.509**
Uncertainty of COP	[–]	± 0.029	± 0.078
Control settings	**[Hz]**	**82**	**74**
Circulation pump settings – heating water	[%]	100	100

Test objective:	Seasonal performance tests and SCOP calculation – Low temperature application
Exact name of the test procedure:	**1.37* - Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions**
Test method:	ČSN EN 14511-3:2024, ČSN EN 14825:2023
Sample tested:	Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP**
Measuring equipment used:	see Chapter III

Design				Air / water – split		
Conditions specification according to ČSN EN 14825:2023	Temperature application				**Low** (reference water temperature 35 °C)	
	Reference heating season				**Average**	
	Outlet water temperature - indoor heat exchanger				Variable	
	Compressor speed control				Variable	
	Water flow rate – primary circuit				–	
	Water flow rate – secondary circuit				Fixed	
Seasonal space heating energy efficiency	Heating	Average	η_s		175.0	%
		Warmer	η_s		–	%
		Colder	η_s		–	%
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**		4.45	–
		Warmer	SCOP		–	–
		Colder	SCOP		–	–
Function	Cooling				Yes	
	Heating	Yes	Reference heating season	Average	Yes	
				Warmer	–	
				Colder	–	
Full heating load	Cooling		$P_{designc}$		–	kW
	Heating	Average	$P_{designh}$		8.50	kW
		Warmer	$P_{designh}$		–	kW
		Colder	$P_{designh}$		–	kW
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-7	°C
		Warmer	$T_{bivalent}$		–	°C
		Colder	$T_{bivalent}$		–	°C
Operation limit temperatures	Heating	Average	TOL		-10	°C
		Warmer	TOL		–	°C
		Colder	TOL		–	°C
Seasonal power consumption according to ČSN EN 14825:2023	Cooling		Q_{CE}		–	kWh
	Heating	Average	Q_{HE}		3946	kWh
		Warmer	Q_{HE}		–	kWh
		Colder	Q_{HE}		–	kWh
Modes other than „active mode“	Off mode			P_{OFF}	7.4	W
	Thermostat off mode			P_{TO}	5.5	W
	Standby mode			P_{SB}	7.4	W
	Crankcase heater mode			P_{CK}	0.0	W

Calculation of SCOP according to ČSN EN 14825:2023:

Number of hours used for calculation of reference SCOP (Annex B – Table B. 2, B. 3)

- For reversible heat pumps and reference heating season „A“ = average

H_{HE}	2066	[h]
H_{TO}	178	[h]
H_{SB}	0	[h]
H_{CK}	178	[h]
H_{OFF}	0	[h]

Measured data:

P_{TO}	0.0055	[kW]
P_{SB}	0.0074	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0074	[kW]
$P_{designh}$	8.50	[kW]
$SCOP_{ON}$	4.45	[–]

Coefficient and correction:

F(1)	3	[%]
F(2)	0	[%]
CC	2.5	[–]

Calculation of SCOP:

7.3 Calculation of the reference annual heating demand (Q_H)

$Q_H = P_{designh} \cdot H_{HE}$ [kWh]

$Q_H = 8.50 \cdot 2066 = 17561$ [kWh]

7.4 Calculation of the annual electricity consumption (Q_{HE})

$Q_{HE} = Q_H / SCOP_{on} + H_{TO} \cdot P_{TO} + H_{SB} \cdot P_{SB} + H_{CK} \cdot P_{CK} + H_{OFF} \cdot P_{OFF}$ [kWh]

$Q_{HE} = 17561 / 4.45 + 178 \cdot 0.0055 + 0 \cdot 0.0074 + 178 \cdot 0 + 0 \cdot 0.0074 = 3946$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 17561 / 3946 = 4.45$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

$\eta_s = 1 / CC \cdot SCOP - \Sigma F(i)$ [–]

$\eta_s (A) = (1 / 2.5) \cdot 4.45 – 0.03 =$ **1.75** [–]

Temperature level		Low (reference water temperature 35 °C)		
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)		
Assessment condition		**A, Tbiv (F)**	**B**	**C**
Specification of the assessment condition		**A-7/W34**	**A2/W30**	**A7/W27.42**
Date of testing		**2024-08-14**	**2024-08-15**	**2024-08-16**
Transient test procedure	YES / NO	YES	NO	NO
Average defrost time of 1 cycle	[min]	5.7	–	–
Average time of 1 cycle	[min]	148.1	–	–
Calculation time	[min]	148.1	70.0	70.0
Output heating water – temperature calculation	[°C]	33.57	30.00	27.41
Input heating water – temperature calculation	[°C]	29.79	27.54	25.49
Output heating water temperature	[°C]	33.99	30.00	27.41
Input heating water temperature	[°C]	29.93	27.54	25.49
Air temperature – dry bulb temperature	[°C]	-6.99	2.13	6.99
Air temperature – wet bulb temperature	[°C]	-8.00	1.11	6.00
Relative humidity	[%]	74.77	83.64	86.88
Barometric pressure	[kPa]	98.029	98.441	98.273
Ambient temperature	[°C]	20.39	20.38	20.35
Secondary circuit pressure difference	[kPa]	58.670	58.512	57.719
Efficiency of the secondary liquid pump	[–]	0.332	0.332	0.330
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.7386	1.7388	1.7342
Density of heating water	[$kg \cdot m^{-3}$]	994.4	995.5	996.2
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.176	4.177
Voltage	[V]	230.56	230.84	230.79
Total current	[A]	12.20	5.32	3.29
Overall power input	[kW]	2.793	1.208	0.735
Capacity correction of sec. liquid pump	[W]	57.003	56.910	56.352
Power input correction of sec. liquid pump	[W]	85.34	85.17	84.16
Heating capacity – heating water	[kW]	7.576	4.927	3.834
Corrected heating capacity – heating water	**[kW]**	**7.519**	**4.871**	**3.778**
Uncertainty of corrected heating capacity	[kW]	± 0.171	± 0.171	± 0.170
Effective electric power input	**[kW]**	**2.708**	**1.123**	**0.651**
COP	**[–]**	**2.777**	**4.339**	**5.805**
Uncertainty of COP	[–]	± 0.063	± 0.153	± 0.264
Control settings	**[Hz]**	**92**	**42**	**28**
Circulation pump settings – heating water	[%]	100	100	100

Temperature level		Low (reference water temperature 35 °C)	
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)	
Assessment condition		**D**	**TOL (E)**
Specification of the assessment condition		**A12/W25.22**	**A-10/W35**
Date of testing		**2024-08-15**	**2024-08-15**
Transient test procedure	YES / NO	NO	YES
Average defrost time of 1 cycle	[min]	–	5.7
Average time of 1 cycle	[min]	–	192.3
Calculation time	[min]	70.0	192.3
Output heating water – temperature calculation	[°C]	25.18	34.68
Input heating water – temperature calculation	[°C]	23.28	30.96
Output heating water temperature	[°C]	25.18	34.99
Input heating water temperature	[°C]	23.28	31.06
Air temperature – dry bulb temperature	[°C]	11.92	-9.91
Air temperature – wet bulb temperature	[°C]	10.95	-10.92
Relative humidity	[%]	89.20	70.06
Barometric pressure	[kPa]	98.538	98.492
Ambient temperature	[°C]	20.48	20.50
Secondary circuit pressure difference	[kPa]	57.027	58.844
Efficiency of the secondary liquid pump	[–]	0.329	0.332
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	1.7354	1.7400
Density of heating water	$[kg \cdot m^{-3}]$	996.8	994.0
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.178	4.175
Voltage	[V]	231.23	230.73
Total current	[A]	2.66	13.12
Overall power input	[kW]	0.593	3.004
Capacity correction of sec. liquid pump	[W]	55.963	57.131
Power input correction of sec. liquid pump	[W]	83.45	85.57
Heating capacity – heating water	[kW]	3.805	7.455
Corrected heating capacity – heating water	**[kW]**	**3.749**	**7.398**
Uncertainty of corrected heating capacity	[kW]	± 0.171	± 0.171
Effective electric power input	**[kW]**	**0.509**	**2.919**
COP	**[–]**	**7.361**	**2.535**
Uncertainty of COP	[–]	± 0.339	± 0.059
Control settings	**[Hz]**	**23**	**97**
Circulation pump settings – heating water	[%]	100	100

Data for SCOP calculation

- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A“ – average

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	34.00	88.46	7.52	7.519	2.777	0.900	1.00	2.777	–
B	2	30.00	53.85	4.58	4.871	4.339	0.900	1.00	4.339	–
C	7	27.42	34.62	2.94	3.778	5.805	0.992	0.78	5.791	0.0055
D	12	25.22	15.38	1.31	3.749	7.361	0.989	0.35	7.215	0.0055
TOL (E)	-10	35.00	100.00	8.50	7.398	2.535	0.900	1.00	2.535	–
Tbiv (F)	-7	34.00	88.46	7.52	7.519	2.777	0.900	1.00	2.777	–

Adaption of water temperature – according to ČSN EN 14825:2023, Annex E

- Low temperature application (reference water temperature 35 °C)
- Reference season „A“– average
- Condition D
- Fixed water flow rate – secondary circuit

General formulas and derivation:

$t_{outlet,\,average} = t_{inlet,\,capacity\,test} + (t_{outlet,\,capacity\,test} - t_{inlet,\,capacity\,test}) \cdot CR$ [°C]

$t_{outlet,\,average} = t_{inlet,\,capacity\,test} + (\Delta t) \cdot CR$ [°C]

$t_{outlet,\,average} = t_{outlet,\,capacity\,test} - \Delta t + \Delta t \cdot CR$ [°C]

$t_{outlet,\,capacity\,test} = t_{outlet,\,average} + \Delta t - \Delta t \cdot CR$ [°C]

For fixed flow:

Δt = Declared capacity / Declared capacity $_{standard\,rating\,conditions\,A7W35} \cdot 5$

$CR \cdot \Delta t$ = Part load / Declared capacity · Declared capacity / Declared capacity $_{standard\,rating\,conditions\,A7W35} \cdot 5$

$CR \cdot \Delta t$ = Part load / Declared capacity $_{standard\,rating\,conditions\,A7W35} \cdot 5$

$t_{outlet,\,capacity\,test,\,fixed\,flow} = t_{outlet,\,average}$ + Declared capacity / Declared capacity $_{standard\,rating\,conditions\,A7W35} \cdot 5$ - Part load / Declared capacity $_{standard\,rating\,conditions\,A7W35} \cdot 5$

$t_{outlet,\,capacity\,test,\,fixed\,flow} = t_{outlet,\,average} + 5$ / Declared capacity $_{standard\,rating\,conditions\,A7W35}$ · (Declared capacity - Part load)

Measured data:

$t_{outlet,\,average}$	24.00	[°C]
Declared capacity	3.749	[kW]
Declared capacity $_{standard\,rating\,condition\,A7/W35}$	9.989	[kW]
Part load	1.31	[kW]

Calculation of water temperature

$t_{outlet,\ capacity\ test,\ fixed\ flow} = 24 + 5 / 9.989 \cdot (3.749 - 1.31) = \mathbf{25.22}$ [°C]

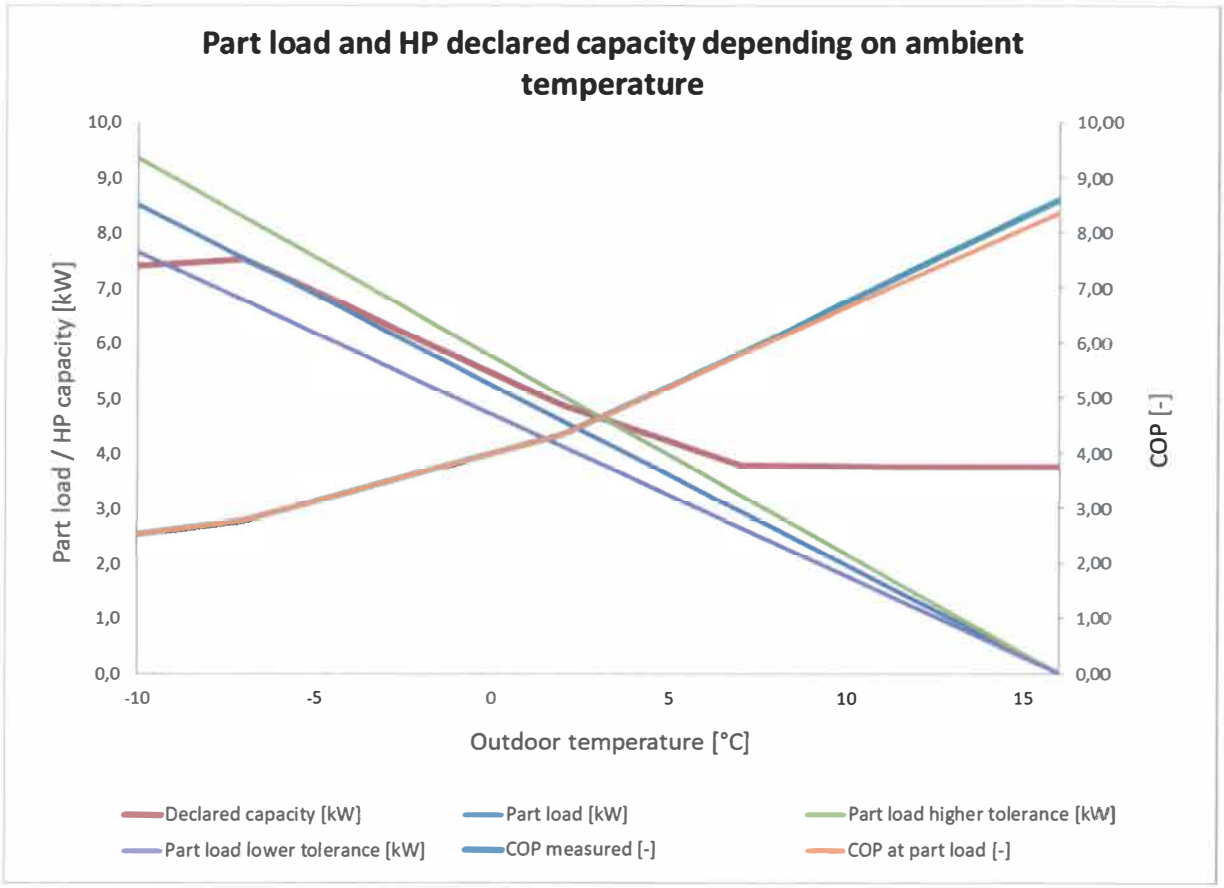
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$

- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A" – average

	Bin j [–]	Outdoor temp. (dry bulb) Tj [°C]	Hours hj [h]	Part load ratio [%]	Heat load Ph(Tj) [kW]	Capacity of HP [kW]	Heat load covered by heat pump [kW]	Resistive heat elbu (Tj) elbu(Tj) [kW]	Annual resistive heat hj x elbu(Tj) [kWh]	COPbin (Tj) COPbin (Tj) [–]	Annual heating demand hj x P h(Tj) [kWh]	Annual power input including electric back up heating [kWh]	Net annual heating capacity hj × (P h(Tj) - elbu(Tj)) [kWh]	Net annual power input without electric back up heating [kWh]
TOL (E)	**21**	**-10**	**1**	**100.00**	**8.50**	**7.40**	**7.40**	**1.10**	**1.10**	**2.53**	**8**	**4**	**7**	**3**
	22	-9	25	96.15	8.17	7.44	7.44	0.73	18.36	2.62	204	89	186	71
	23	-8	23	92.31	7.85	7.48	7.48	0.37	8.45	2.70	180	72	172	64
A, Tbiv (F)	**24**	**-7**	**24**	**88.46**	**7.52**	**7.52**	**7.52**	**0.00**	**0.00**	**2.78**	**180**	**65**	**180**	**65**
	25	-6	27	84.62	7.19	7.22	7.19	0.00	0.00	2.95	194	66	194	66
	26	-5	68	80.77	6.87	6.93	6.87	0.00	0.00	3.12	467	149	467	149
	27	-4	91	76.92	6.54	6.64	6.54	0.00	0.00	3.30	595	180	595	180
	28	-3	89	73.08	6.21	6.34	6.21	0.00	0.00	3.47	553	159	553	159
	29	-2	165	69.23	5.88	6.05	5.88	0.00	0.00	3.64	971	266	971	266
	30	-1	173	65.38	5.56	5.75	5.56	0.00	0.00	3.82	961	252	961	252
	31	0	240	61.54	5.23	5.46	5.23	0.00	0.00	3.99	1255	314	1255	314
	32	1	280	57.69	4.90	5.16	4.90	0.00	0.00	4.17	1373	330	1373	330
B	**33**	**2**	**320**	**53.85**	**4.58**	**4.87**	**4.58**	**0.00**	**0.00**	**4.34**	**1465**	**338**	**1465**	**338**
	34	3	357	50.00	4.25	4.65	4.25	0.00	0.00	4.63	1517	328	1517	328
	35	4	356	46.15	3.92	4.43	3.92	0.00	0.00	4.92	1397	284	1397	284
	36	5	303	42.31	3.60	4.21	3.60	0.00	0.00	5.21	1090	209	1090	209
	37	6	330	38.46	3.27	4.00	3.27	0.00	0.00	5.50	1079	196	1079	196
C	**38**	**7**	**326**	**34.62**	**2.94**	**3.78**	**2.94**	**0.00**	**0.00**	**5.79**	**959**	**166**	**959**	**166**
	39	8	348	30.77	2.62	3.77	2.62	0.00	0.00	6.08	910	150	910	150
	40	9	335	26.92	2.29	3.77	2.29	0.00	0.00	6.36	767	121	767	121
	41	10	315	23.08	1.96	3.76	1.96	0.00	0.00	6.65	618	93	618	93
	42	11	215	19.23	1.63	3.75	1.63	0.00	0.00	6.93	351	51	351	51
D	**43**	**12**	**169**	**15.38**	**1.31**	**3.75**	**1.31**	**0.00**	**0.00**	**7.22**	**221**	**31**	**221**	**31**
	44	13	151	11.54	0.98	3.74	0.98	0.00	0.00	7.50	148	20	148	20
	45	14	105	7.69	0.65	3.74	0.65	0.00	0.00	7.79	69	9	69	9
	46	15	74	3.85	0.33	3.73	0.33	0.00	0.00	8.07	24	3	24	3
		Σ	4910							Σ	17558	3944	17530	3916

SCOPon	4.45	SCOPnet	4.48
		SCOP	**4.45**

Part load performance diagram
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A“ – average



Test objective:	Seasonal performance tests and SCOP calculation – Medium temperature application
Exact name of the test procedure:	**1.37* - Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions**
Test method:	ČSN EN 14511-3:2024, ČSN EN 14825:2023
Sample tested:	Heat pump **VDS-100W/EN8BP+VDS-100B/EN8BP**
Measuring equipment used:	see Chapter III

Design				Air / water – split		
Conditions specification according to ČSN EN 14825:2023	Temperature application				**Medium** (reference water temperature 55 °C)	
	Reference heating season				**Average**	
	Outlet water temperature - indoor heat exchanger				Variable	
	Compressor speed control				Variable	
	Water flow rate – primary circuit				–	
	Water flow rate – secondary circuit				Fixed	
Seasonal space heating energy efficiency	Heating	Average	η_s		133.0	%
		Warmer	η_s		–	%
		Colder	η_s		–	%
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**		3.40	–
		Warmer	SCOP		–	–
		Colder	SCOP		–	–
Function	Cooling				Yes	
	Heating	Yes	Reference heating season	Average	Yes	
				Warmer	–	
				Colder	–	
Full heating load	Cooling		$P_{designc}$		–	kW
	Heating	Average	$P_{designh}$		8.94	kW
		Warmer	$P_{designh}$		–	kW
		Colder	$P_{designh}$		–	kW
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-7	°C
		Warmer	$T_{bivalent}$		–	°C
		Colder	$T_{bivalent}$		–	°C
Operation limit temperatures	Heating	Average	TOL		-10	°C
		Warmer	TOL		–	°C
		Colder	TOL		–	°C
Seasonal power consumption according to ČSN EN 14825:2023	Cooling		Q_{CE}		–	kWh
	Heating	Average	Q_{HE}		5435	kWh
		Warmer	Q_{HE}		–	kWh
		Colder	Q_{HE}		–	kWh
Modes other than „active mode“	Off mode			P_{OFF}	7.4	W
	Thermostat off mode			P_{TO}	5.5	W
	Standby mode			P_{SB}	7.4	W
	Crankcase heater mode			P_{CK}	0.0	W

Calculation of SCOP according to ČSN EN 14825:2023:

Number of hours used for calculation of reference SCOP (Annex B – Table B. 2, B. 3)

- For reversible heat pumps and reference heating season „A“ = average

H_{HE}	2066	[h]
H_{TO}	178	[h]
H_{SB}	0	[h]
H_{CK}	178	[h]
H_{OFF}	0	[h]

Measured data:

P_{TO}	0.0055	[kW]
P_{SB}	0.0074	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0074	[kW]
$P_{designh}$	8.94	[kW]
$SCOP_{ON}$	3.40	[–]

Coefficient and correction:

F(1)	3	[%]
F(2)	0	[%]
CC	2.5	[–]

Calculation of SCOP:

7.3 Calculation of the reference annual heating demand (Q_H)

$Q_H = P_{designh} \cdot H_{HE}$ [kWh]

$Q_H = 8.94 \cdot 2066 = 18474$ [kWh]

7.4 Calculation of the annual electricity consumption (Q_{HE})

$Q_{HE} = Q_H / SCOP_{on} + H_{TO} \cdot P_{TO} + H_{SB} \cdot P_{SB} + H_{CK} \cdot P_{CK} + H_{OFF} \cdot P_{OFF}$ [kWh]

$Q_{HE} = 18474 / 3.40 + 178 \cdot 0.0074 + 0 \cdot 0.0074 + 178 \cdot 0 + 0 \cdot 0 = 5435$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 18474 / 5435 = 3.40$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

$\eta_s = 1 / CC \cdot SCOP - \Sigma F(i)$ [–]

$\eta_s (A) = (1 / 2.5) \cdot 3.40 – 0.03 =$ **1.33** [–]

Temperature level		Medium (reference water temperature 55 °C)		
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)		
Assessment condition		**A, Tbiv (F)**	**B**	**C**
Specification of the assessment condition		**A-7/W52**	**A2/W42**	**A7/W36**
Date of testing		**2024-08-13**	**2024-08-13**	**2024-08-13**
Transient test procedure	YES / NO	NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–	–
Average time of 1 cycle	[min]	–	–	–
Calculation time	[min]	70.0	70.0	70.0
Output heating water – temperature calculation	[°C]	51.99	42.00	36.00
Input heating water – temperature calculation	[°C]	46.12	38.67	33.57
Output heating water temperature	[°C]	51.99	42.00	36.00
Input heating water temperature	[°C]	46.12	38.67	33.57
Air temperature – dry bulb temperature	[°C]	-6.99	2.01	6.95
Air temperature – wet bulb temperature	[°C]	-8.01	1.01	5.96
Relative humidity	[%]	74.73	83.82	86.88
Barometric pressure	[kPa]	98.276	98.198	98.098
Ambient temperature	[°C]	20.57	20.57	20.56
Secondary circuit pressure difference	[kPa]	78.506	78.420	78.438
Efficiency of the secondary liquid pump	[–]	0.323	0.323	0.323
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.1790	1.1805	1.1760
Density of heating water	[$kg \cdot m^{-3}$]	987.2	991.4	993.6
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.178	4.175	4.175
Voltage	[V]	230.33	230.65	230.87
Total current	[A]	16.91	6.22	3.65
Overall power input	[kW]	3.864	1.421	0.824
Capacity correction of sec. liquid pump	[W]	53.775	53.781	53.671
Power input correction of sec. liquid pump	[W]	79.48	79.49	79.29
Heating capacity – heating water	[kW]	7.964	4.523	3.290
Corrected heating capacity – heating water	**[kW]**	**7.910**	**4.470**	**3.237**
Uncertainty of corrected heating capacity	[kW]	± 0.116	± 0.116	± 0.115
Effective electric power input	**[kW]**	**3.784**	**1.342**	**0.744**
COP	**[–]**	**2.090**	**3.332**	**4.348**
Uncertainty of COP	[–]	± 0.031	± 0.087	± 0.157
Control settings	**[Hz]**	**93**	**41**	**26**
Circulation pump settings – heating water	[%]	100	100	100

Temperature level		Medium (reference water temperature 55 °C)	
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)	
Assessment condition		**D**	**TOL (E)**
Specification of the assessment condition		**A12/W32.42**	**A-10/W55**
Date of testing		**2024-08-16**	**2024-08-14**
Transient test procedure	YES / NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–
Average time of 1 cycle	[min]	–	–
Calculation time	[min]	70.0	70.0
Output heating water – temperature calculation	[°C]	32.43	55.00
Input heating water – temperature calculation	[°C]	29.00	49.91
Output heating water temperature	[°C]	32.43	55.00
Input heating water temperature	[°C]	29.00	49.91
Air temperature – dry bulb temperature	[°C]	11.89	-9.89
Air temperature – wet bulb temperature	[°C]	10.90	-10.90
Relative humidity	[%]	88.98	69.78
Barometric pressure	[kPa]	98.565	98.244
Ambient temperature	[°C]	20.25	27.98
Secondary circuit pressure difference	[kPa]	78.422	78.324
Efficiency of the secondary liquid pump	[–]	0.324	0.323
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	1.1892	1.1756
Density of heating water	$[kg \cdot m^{-3}]$	994.8	985.8
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.175	4.179
Voltage	[V]	230.69	230.56
Total current	[A]	3.62	19.43
Overall power input	[kW]	0.813	4.433
Capacity correction of sec. liquid pump	[W]	54.017	53.616
Power input correction of sec. liquid pump	[W]	79.92	79.19
Heating capacity – heating water	[kW]	4.687	6.877
Corrected heating capacity – heating water	**[kW]**	**4.633**	**6.823**
Uncertainty of corrected heating capacity	[kW]	± 0.117	± 0.115
Effective electric power input	**[kW]**	**0.733**	**4.354**
COP	**[–]**	**6.319**	**1.567**
Uncertainty of COP	[–]	± 0.163	± 0.026
Control settings	**[Hz]**	**30**	**99**
Circulation pump settings – heating water	[%]	100	100

Data for SCOP calculation

- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A“ – average

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	52.00	88.46	7.91	7.910	2.090	0.900	1.00	2.090	–
B	2	42.00	53.85	4.81	4.470	3.332	0.900	1.00	3.332	–
C	7	36.00	34.62	3.10	3.237	4.348	0.900	1.00	4.348	–
D	12	32.42	15.38	1.38	4.633	6.319	0.992	0.30	6.209	0.0055
TOL (E)	-10	55.00	100.00	8.94	6.823	1.567	0.900	1.00	1.567	–
Tbiv (F)	-7	52.00	88.46	7.91	7.910	2.090	0.900	1.00	2.090	–

Adaption of water temperature – according to ČSN EN 14825:2023, Annex E

- Medium temperature application (reference water temperature 55 °C)
- Reference season „A“– average
- Condition D
- Fixed water flow rate – secondary circuit

General formulas and derivation:

$t_{outlet,\,average} = t_{inlet,\,capacity\,test} + (t_{outlet,\,capacity\,test} - t_{inlet,\,capacity\,test}) \cdot CR$ [°C]

$t_{outlet,\,average} = t_{inlet,\,capacity\,test} + (\Delta t) \cdot CR$ [°C]

$t_{outlet,\,average} = t_{outlet,\,capacity\,test} - \Delta t + \Delta t \cdot CR$ [°C]

$t_{outlet,\,capacity\,test} = t_{outlet,\,average} + \Delta t - \Delta t \cdot CR$ [°C]

For fixed flow:

Δt = Declared capacity / Declared capacity $_{standard\ rating\ conditions\ A7W55} \cdot 8$

$CR \cdot \Delta t$ = Part load / Declared capacity · Declared capacity / Declared capacity $_{standard\ rating\ conditions\ A7W55} \cdot 8$

$CR \cdot \Delta t$ = Part load / Declared capacity $_{standard\ rating\ conditions\ A7W55} \cdot 8$

$t_{outlet,\,capacity\,test,\,fixed\,flow} = t_{outlet,\,average}$ + Declared capacity / Declared capacity $_{standard\ rating\ conditions\ A7W55} \cdot 8$ - Part load / Declared capacity $_{standard\ rating\ conditions\ A7W55} \cdot 8$

$t_{outlet,\,capacity\,test,\,fixed\,flow} = t_{outlet,\,average} + 8$ / Declared capacity $_{standard\ rating\ conditions\ A7W55}$ · (Declared capacity - Part load)

Measured data:

$t_{outlet,\,average}$	30.00	[°C]
Declared capacity	4.633	[kW]
Declared capacity $_{standard\ rating\ condition\ A7/W55}$	10.788	[kW]
Part load	1.38	[kW]

Calculation of water temperature

$t_{outlet,\ capacity\ test,\ fixed\ flow} = 30 + 8 / 10.788 \cdot (4.633 - 1.38) = \mathbf{32.42}$ [°C]

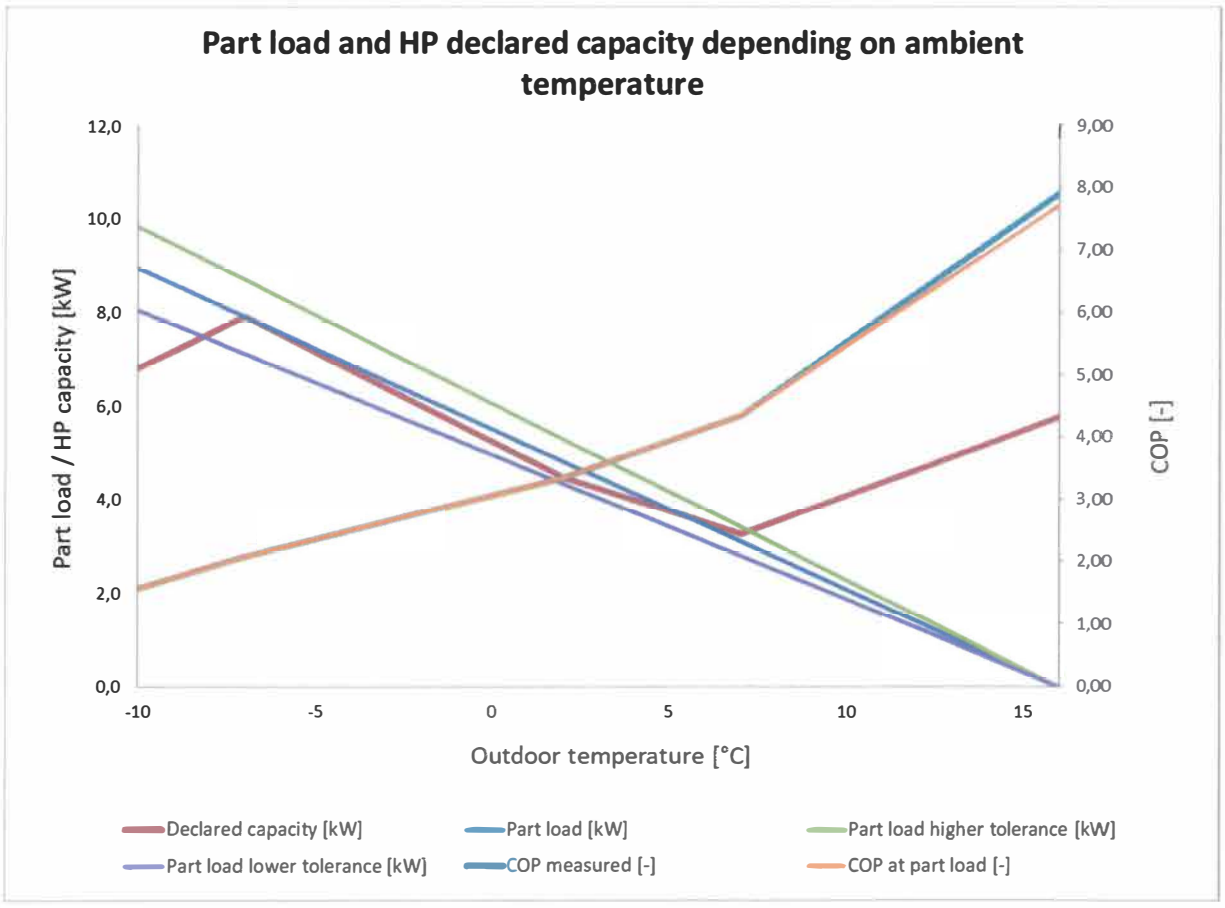
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$

- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A" – average

	Bin j [–]	Outdoor temp. (dry bulb) Tj [°C]	Hours hj [h]	Part load ratio [%]	Heat load Ph(Tj) [kW]	Capacity of HP [kW]	Heat load covered by heat pump [kW]	Resistive heat elbu (Tj) elbu(Tj) [kW]	Annual resistive heat hj x elbu(Tj) [kWh]	COPbin (Tj) COPbin (Tj) [–]	Annual heating demand hj x P h(Tj) [kWh]	Annual power input including electric back up heating [kWh]	Net annual heating capacity hj x (P h(Tj) - elbu(Tj)) [kWh]	Net annual power input without electric back up heating [kWh]
TOL (E)	**21**	**-10**	**1**	**100.00**	**8.94**	**6.82**	**6.82**	**2.12**	**2.12**	**1.57**	**9**	**6**	**7**	**4**
	22	-9	25	96.15	8.60	7.19	7.19	1.41	35.31	1.74	215	138	180	103
	23	-8	23	92.31	8.25	7.55	7.55	0.71	16.24	1.92	190	107	174	91
A, Tbiv(F)	**24**	**-7**	**24**	**88.46**	**7.91**	**7.91**	**7.91**	**0.00**	**0.00**	**2.09**	**190**	**91**	**190**	**91**
	25	-6	27	84.62	7.57	7.53	7.53	0.00	0.00	2.23	204	92	204	92
	26	-5	68	80.77	7.22	7.15	7.15	0.00	0.00	2.37	491	208	491	208
	27	-4	91	76.92	6.88	6.76	6.76	0.00	0.00	2.50	626	250	626	250
	28	-3	89	73.08	6.53	6.38	6.38	0.00	0.00	2.64	582	220	582	220
	29	-2	165	69.23	6.19	6.00	6.00	0.00	0.00	2.78	1021	367	1021	367
	30	-1	173	65.38	5.85	5.62	5.62	0.00	0.00	2.92	1011	347	1011	347
	31	0	240	61.54	5.50	5.23	5.23	0.00	0.00	3.06	1321	432	1321	432
	32	1	280	57.69	5.16	4.85	4.85	0.00	0.00	3.19	1444	452	1444	452
B	**33**	**2**	**320**	**53.85**	**4.81**	**4.47**	**4.47**	**0.00**	**0.00**	**3.33**	**1541**	**462**	**1541**	**462**
	34	3	357	50.00	4.47	4.22	4.22	0.00	0.00	3.54	1596	452	1596	452
	35	4	356	46.15	4.13	3.98	3.98	0.00	0.00	3.74	1469	393	1469	393
	36	5	303	42.31	3.78	3.73	3.73	0.00	0.00	3.94	1146	291	1146	291
	37	6	330	38.46	3.44	3.48	3.44	0.00	0.00	4.14	1135	274	1135	274
C	**38**	**7**	**326**	**34.62**	**3.10**	**3.24**	**3.10**	**0.00**	**0.00**	**4.35**	**1009**	**232**	**1009**	**232**
	39	8	348	30.77	2.75	3.52	2.75	0.00	0.00	4.72	957	203	957	203
	40	9	335	26.92	2.41	3.80	2.41	0.00	0.00	5.09	806	158	806	158
	41	10	315	23.08	2.06	4.07	2.06	0.00	0.00	5.46	650	119	650	119
	42	11	215	19.23	1.72	4.35	1.72	0.00	0.00	5.84	370	63	370	63
D	**43**	**12**	**169**	**15.38**	**1.38**	**4.63**	**1.38**	**0.00**	**0.00**	**6.21**	**232**	**37**	**232**	**37**
	44	13	151	11.54	1.03	4.91	1.03	0.00	0.00	6.58	156	24	156	24
	45	14	105	7.69	0.69	5.19	0.69	0.00	0.00	6.95	72	10	72	10
	46	15	74	3.85	0.34	5.47	0.34	0.00	0.00	7.33	25	3	25	3
		Σ	4910							Σ	18470	5433	18417	5379

SCOPon	3.40	SCOPnet	3.42
		SCOP	**3.40**

Part load performance diagram
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A“ – average

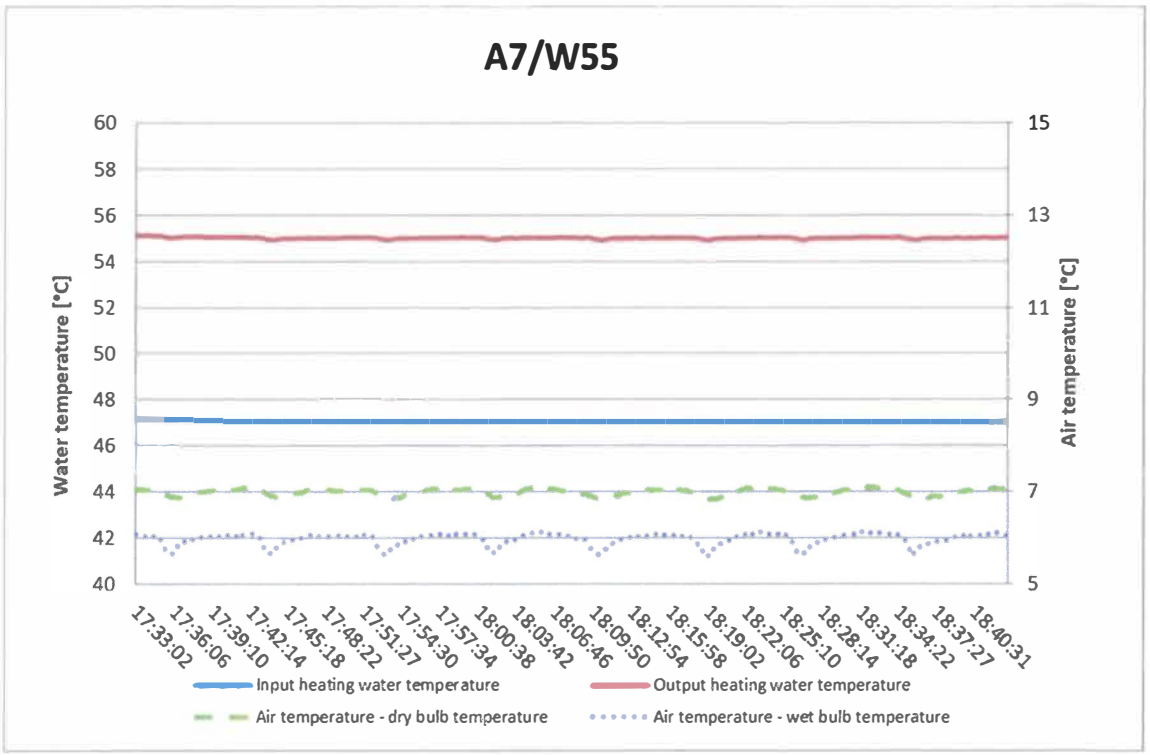


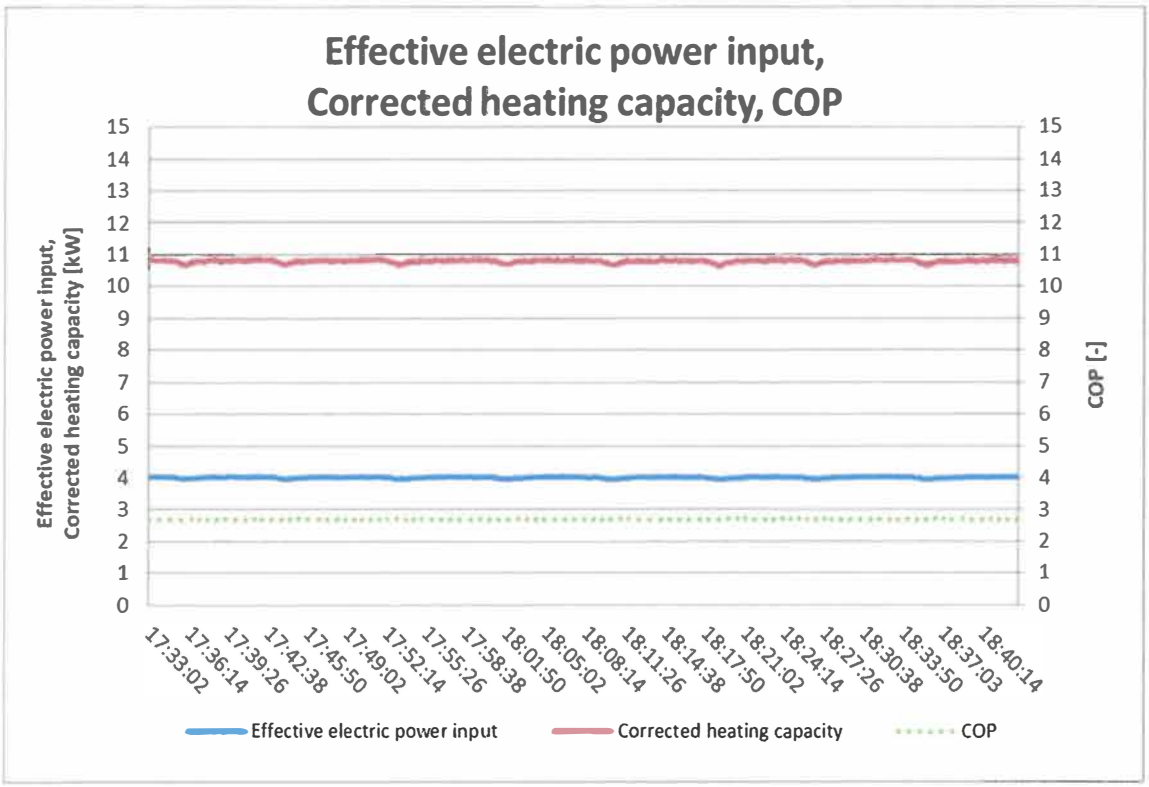
Tested by:	Ing. Dominik Šedivý, Ph.D.	Date:	2024-08-28	Signed:	
Reviewed and approved by:	Ing. Michal Faltýnek	Date:	2024-08-28	Signed:	

V. Graphs

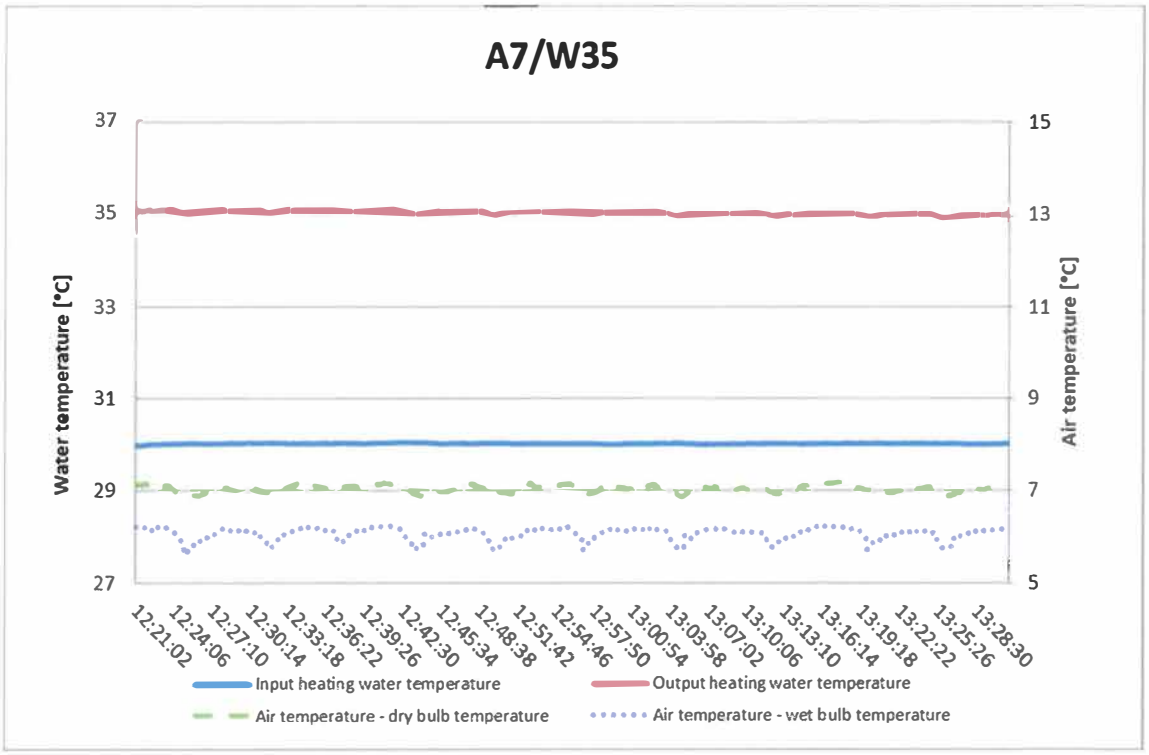
1. Rating conditions

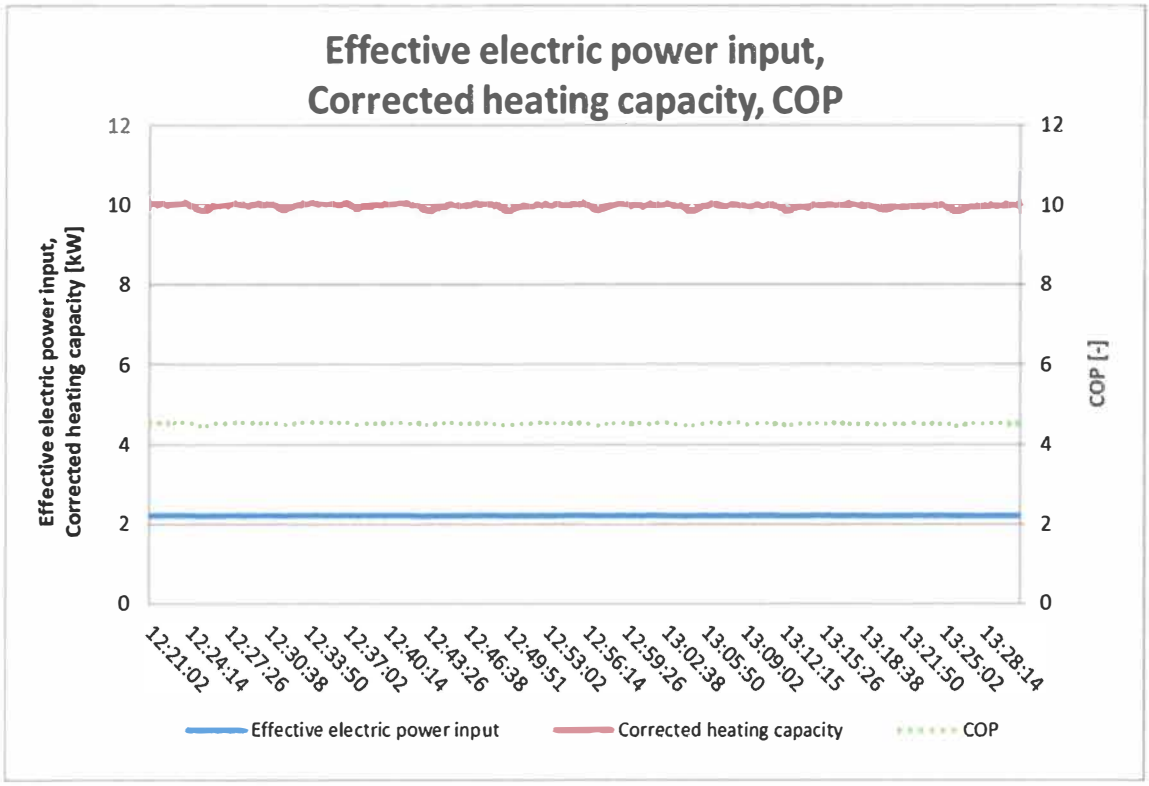
A7/W55 (82 Hz)





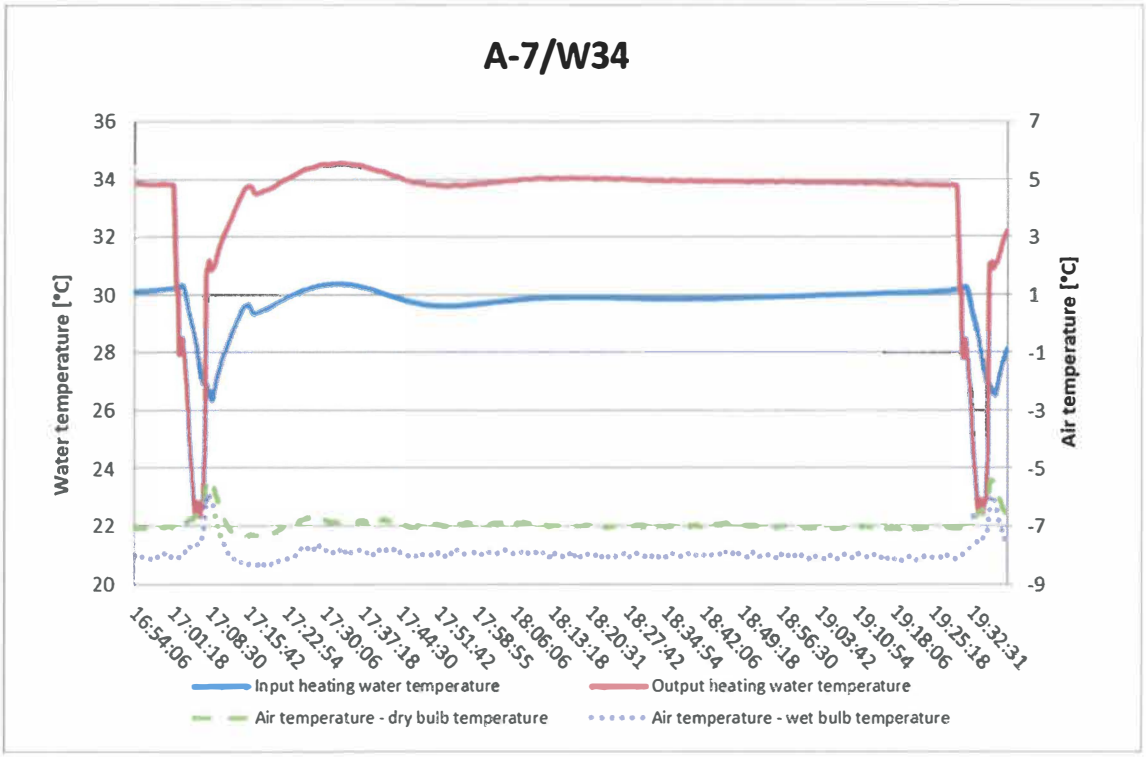
A7/W35 (74 Hz)

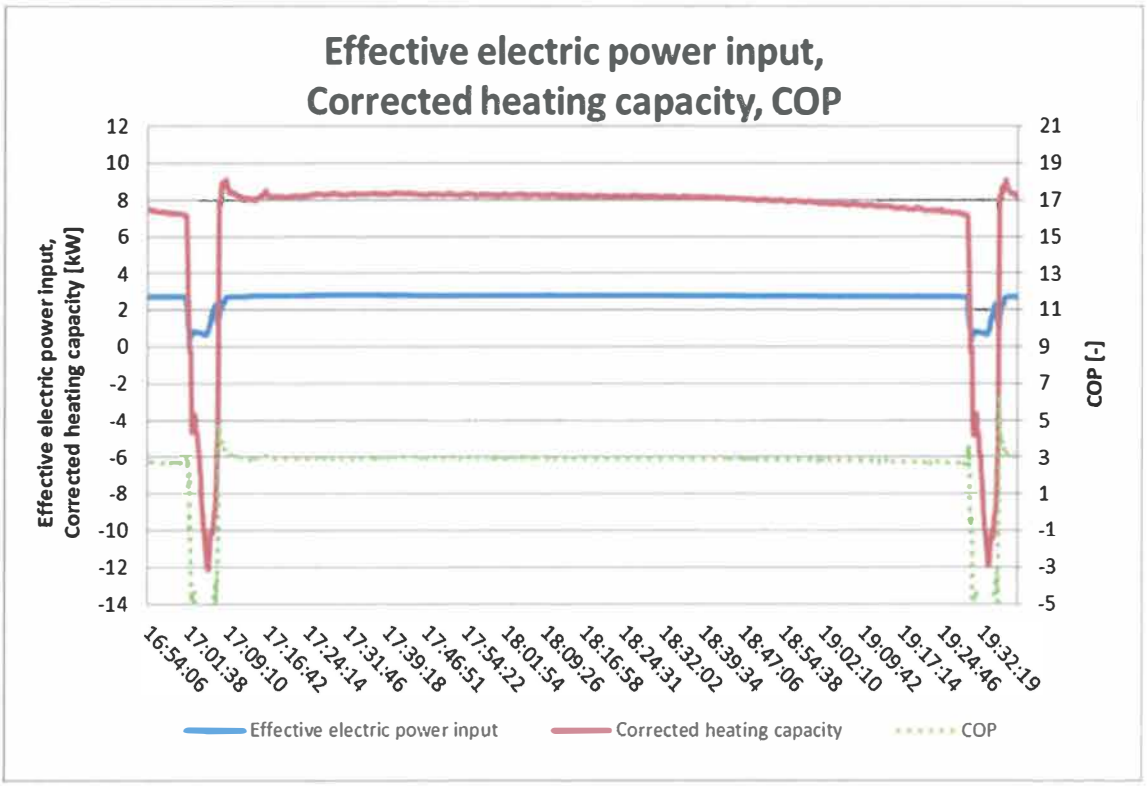

A7/W35
Water temperature [°C]
Air temperature [°C]
37
35
33
31
29
27
15
13
11
9
7
5
12:21:02
12:24:06
12:27:10
12:30:14
12:33:18
12:36:22
12:39:26
12:42:30
12:45:34
12:48:38
12:51:42
12:54:46
12:57:50
13:00:54
13:03:58
13:07:02
13:10:06
13:13:10
13:16:14
13:19:18
13:22:22
13:25:26
13:28:30
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature


Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
12
10
8
6
4
2
0
12:21:02
12:24:14
12:27:26
12:30:38
12:33:50
12:37:02
12:40:14
12:43:26
12:46:38
12:49:51
12:53:02
12:56:14
12:59:26
13:02:38
13:05:50
13:09:02
13:12:15
13:15:26
13:18:38
13:21:50
13:25:02
13:28:14
Effective electric power input
Corrected heating capacity
COP

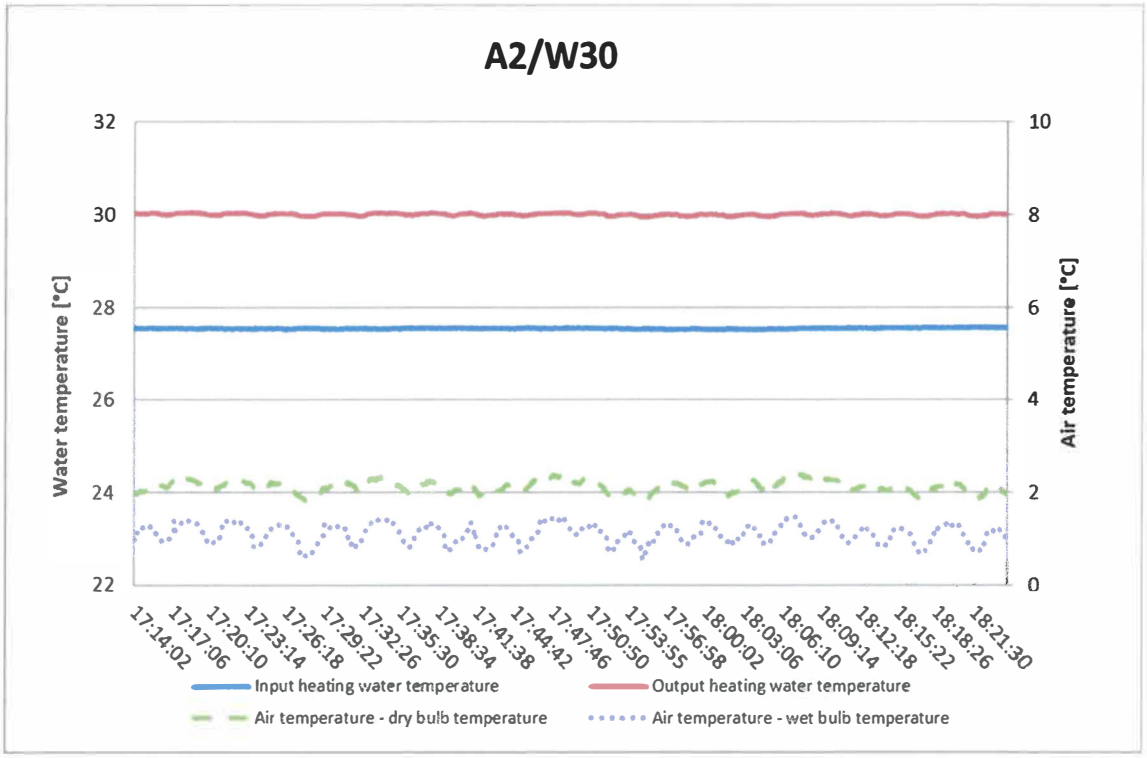
2. Seasonal performance tests and SCOP calculation – Low temperature application

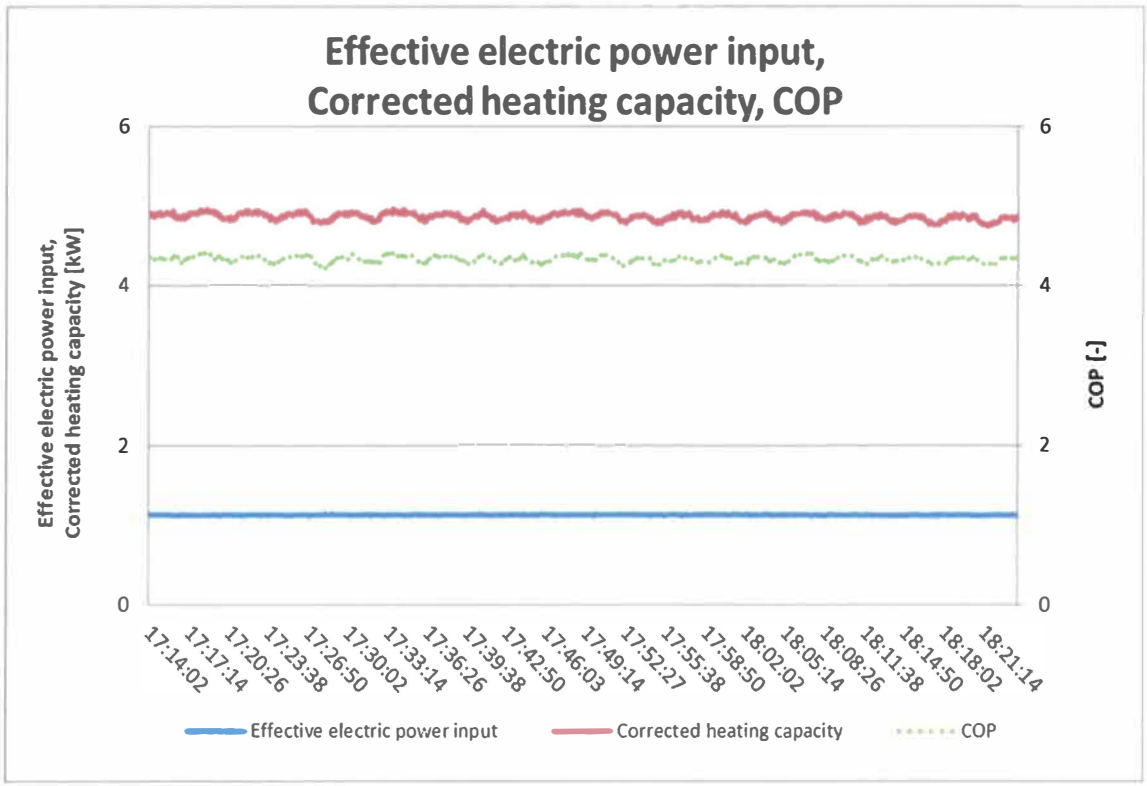
A-7/W34 (92 Hz)



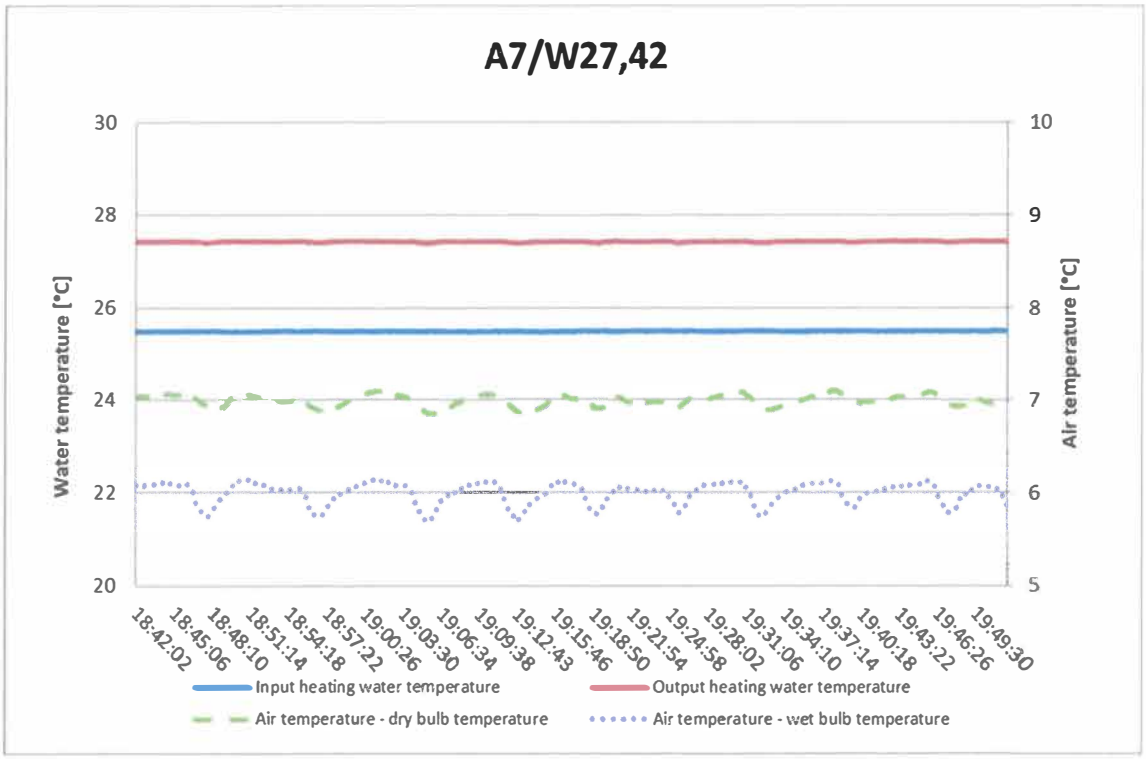


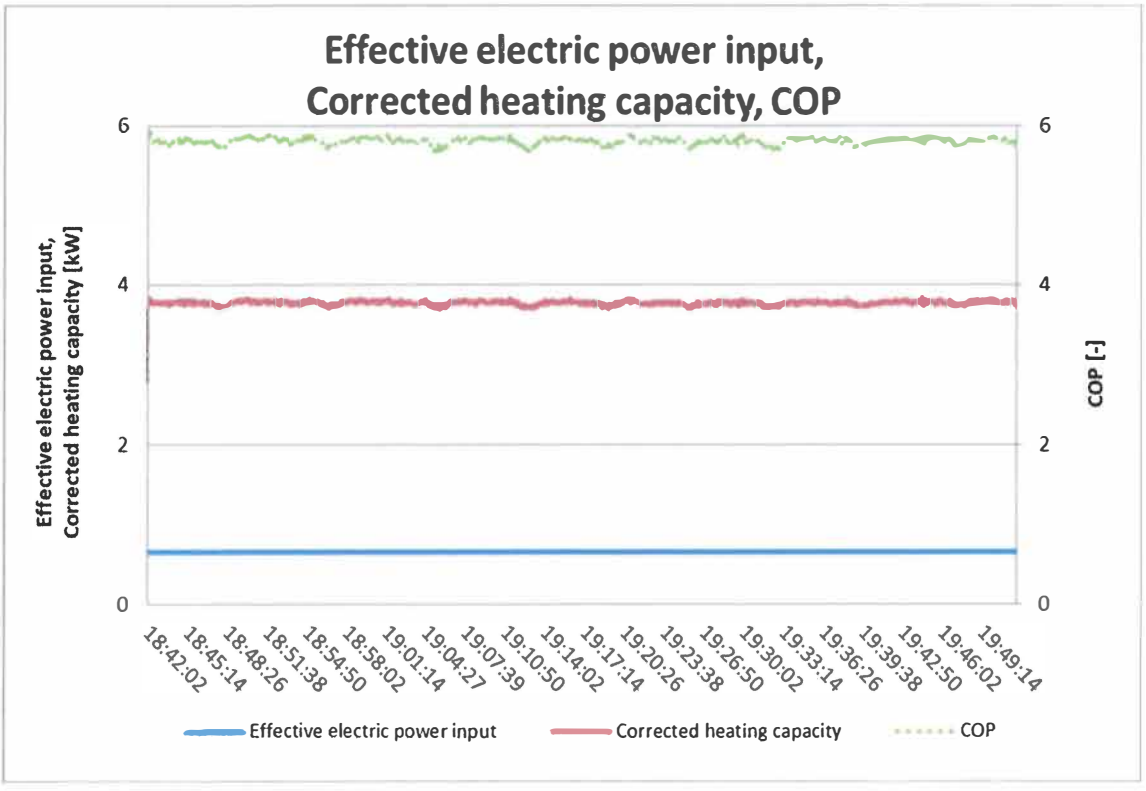
A2/W30 (42 Hz)


A2/W30
Water temperature [°C]
Air temperature [°C]
32
30
28
26
24
22
10
8
6
4
2
0
17:14:02
17:17:06
17:20:10
17:23:14
17:26:18
17:29:22
17:32:26
17:35:30
17:38:34
17:41:38
17:44:42
17:47:46
17:50:50
17:53:55
17:56:58
18:00:02
18:03:06
18:06:10
18:09:14
18:12:18
18:15:22
18:18:26
18:21:30
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

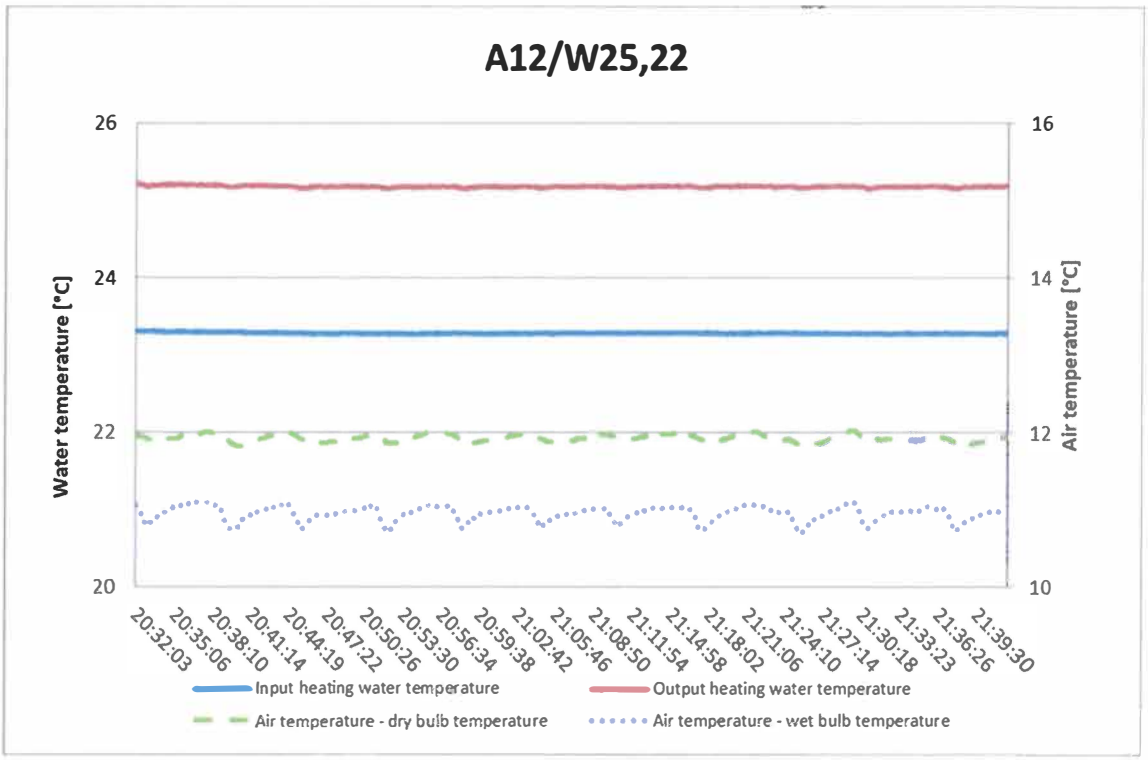

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
6
4
2
0
17:14:02
17:17:14
17:20:26
17:23:38
17:26:50
17:30:02
17:33:14
17:36:26
17:39:38
17:42:50
17:46:03
17:49:14
17:52:27
17:55:38
17:58:50
18:02:02
18:05:14
18:08:26
18:11:38
18:14:50
18:18:02
18:21:14
Effective electric power input
Corrected heating capacity
COP

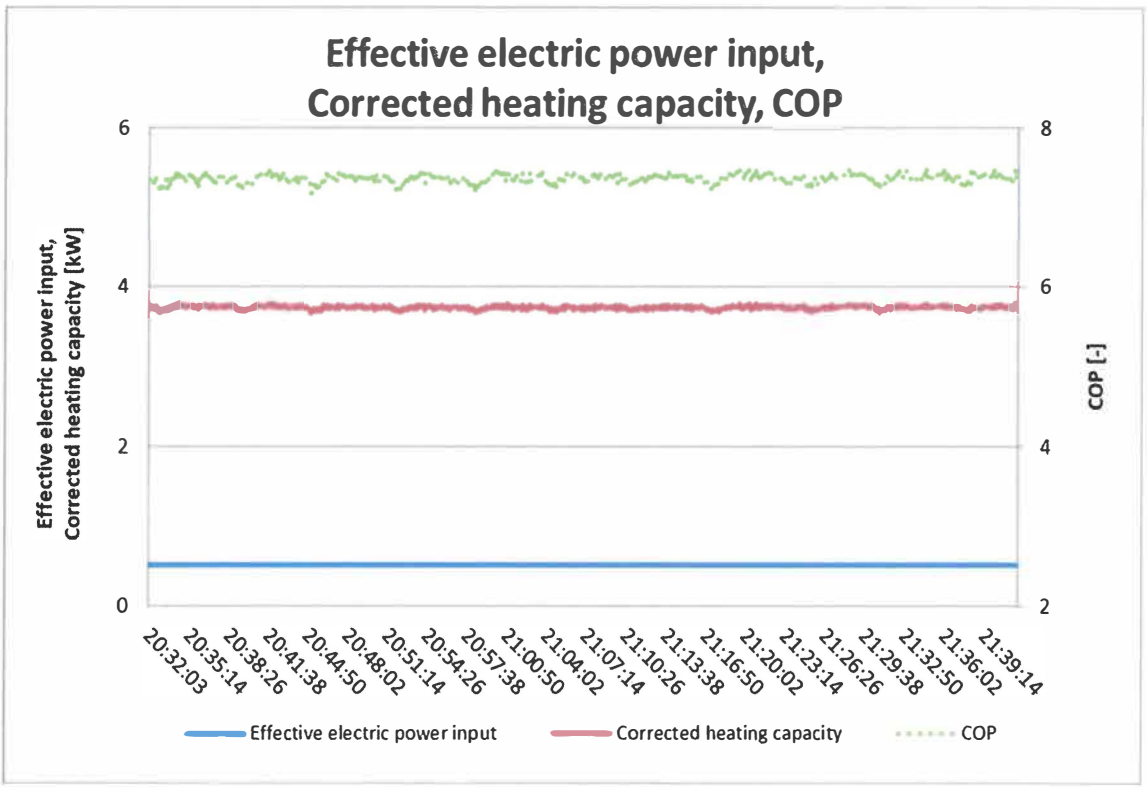
A7/W27.42 (28 Hz)



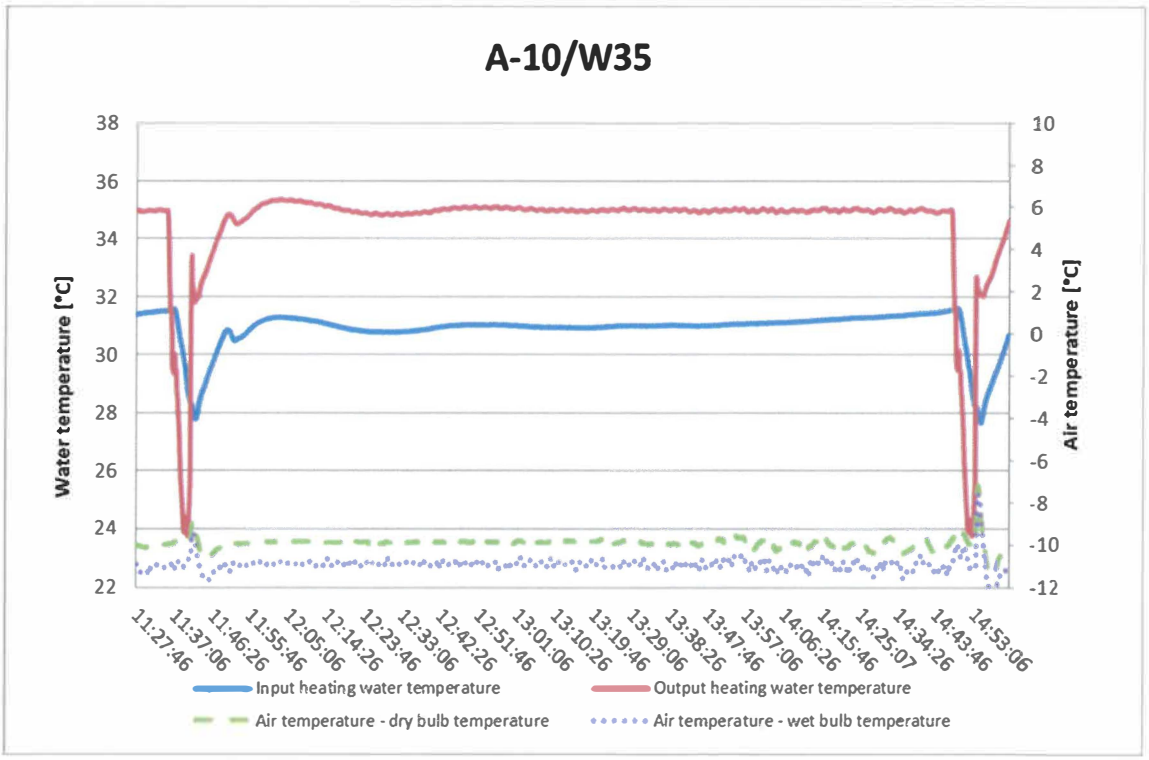


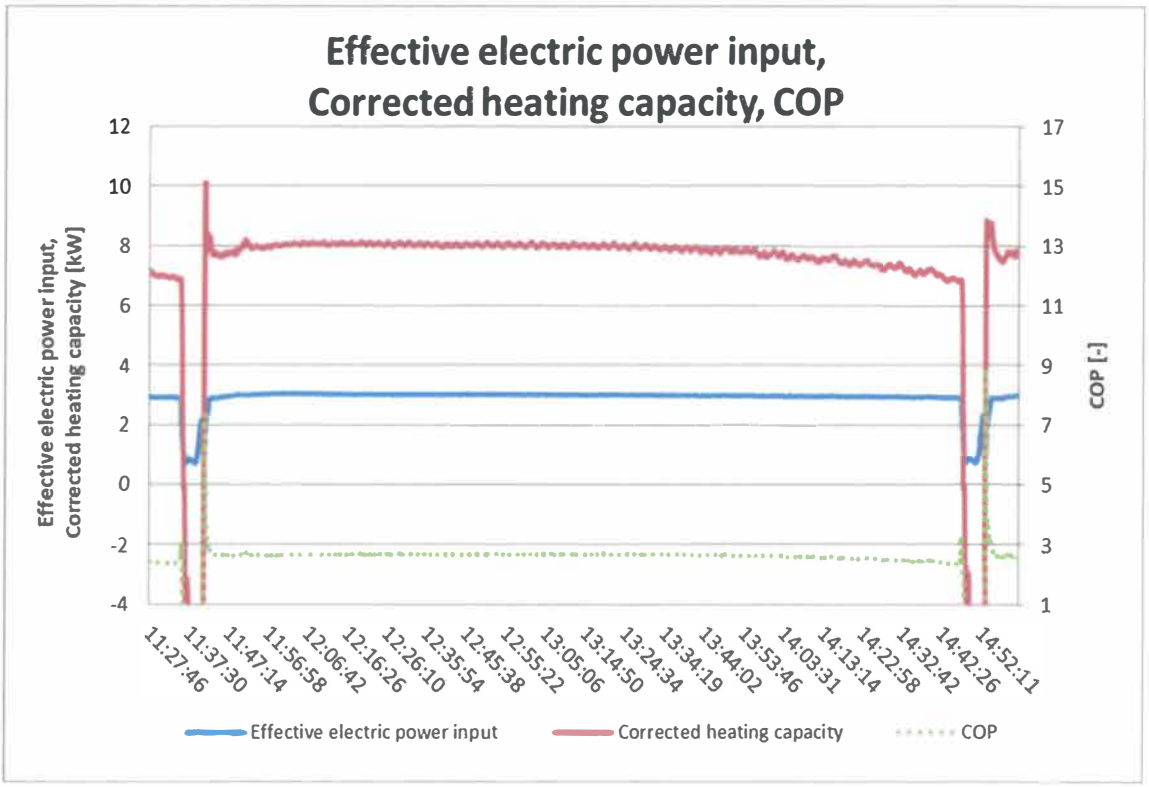
A12/W25.22 (23 Hz)





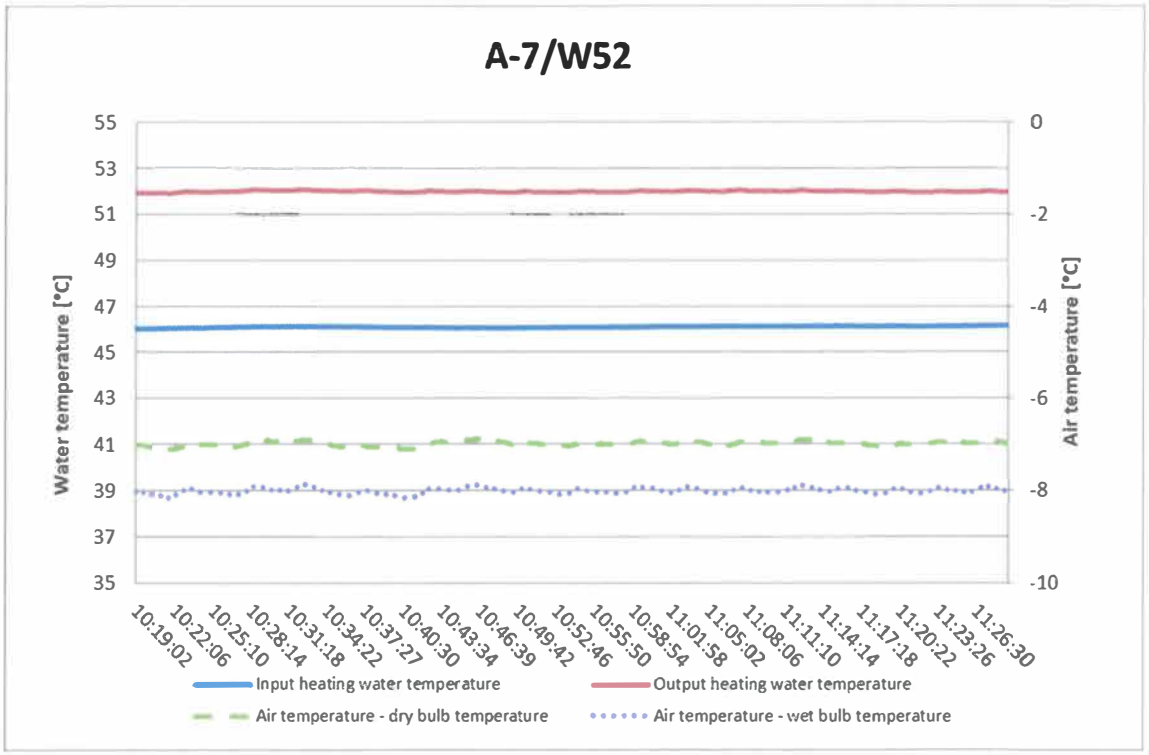
A-10/W35 (97 Hz)

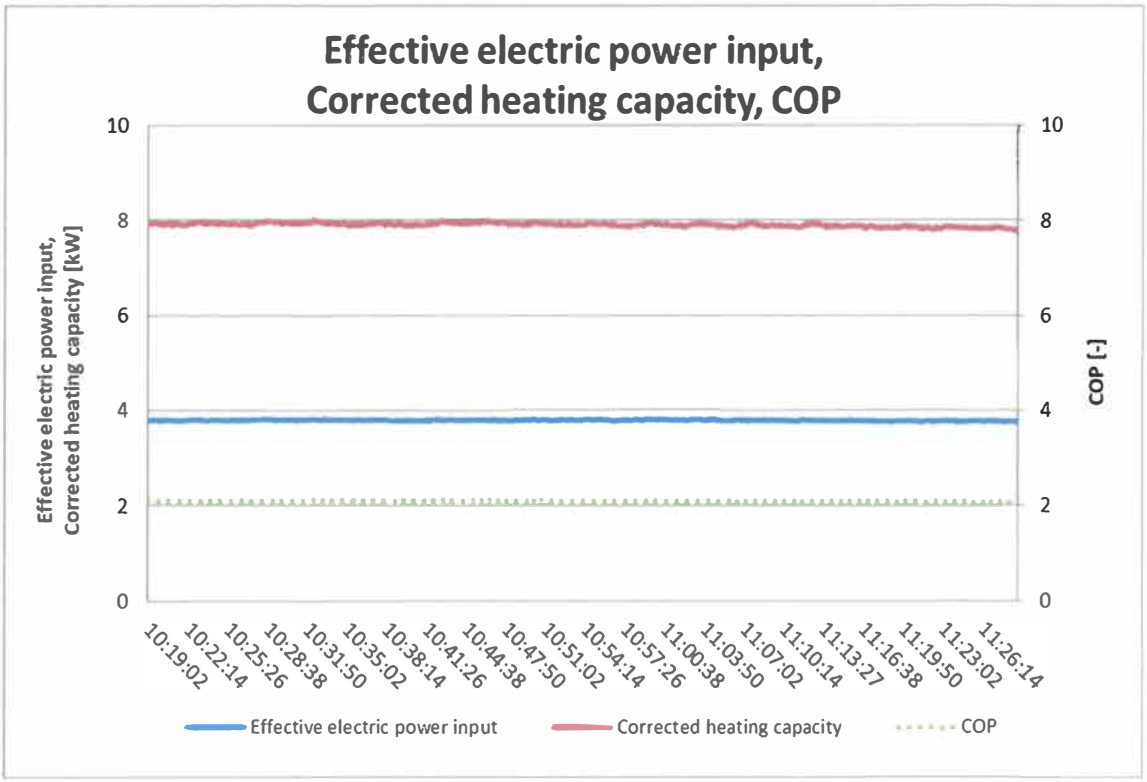

A-10/W35
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
26
24
22
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
11:27:46
11:37:06
11:46:26
11:55:46
12:05:06
12:14:26
12:23:46
12:33:06
12:42:26
12:51:46
13:01:06
13:10:26
13:19:46
13:29:06
13:38:26
13:47:46
13:57:06
14:06:26
14:15:46
14:25:07
14:34:26
14:43:46
14:53:06
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature


Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
12
10
8
6
4
2
0
-2
-4
17
15
13
11
9
7
5
3
1
11:27:46
11:37:30
11:47:14
11:56:58
12:06:42
12:16:26
12:26:10
12:35:54
12:45:38
12:55:22
13:05:06
13:14:50
13:24:34
13:34:19
13:44:02
13:53:46
14:03:31
14:13:14
14:22:58
14:32:42
14:42:26
14:52:11
Effective electric power input
Corrected heating capacity
COP

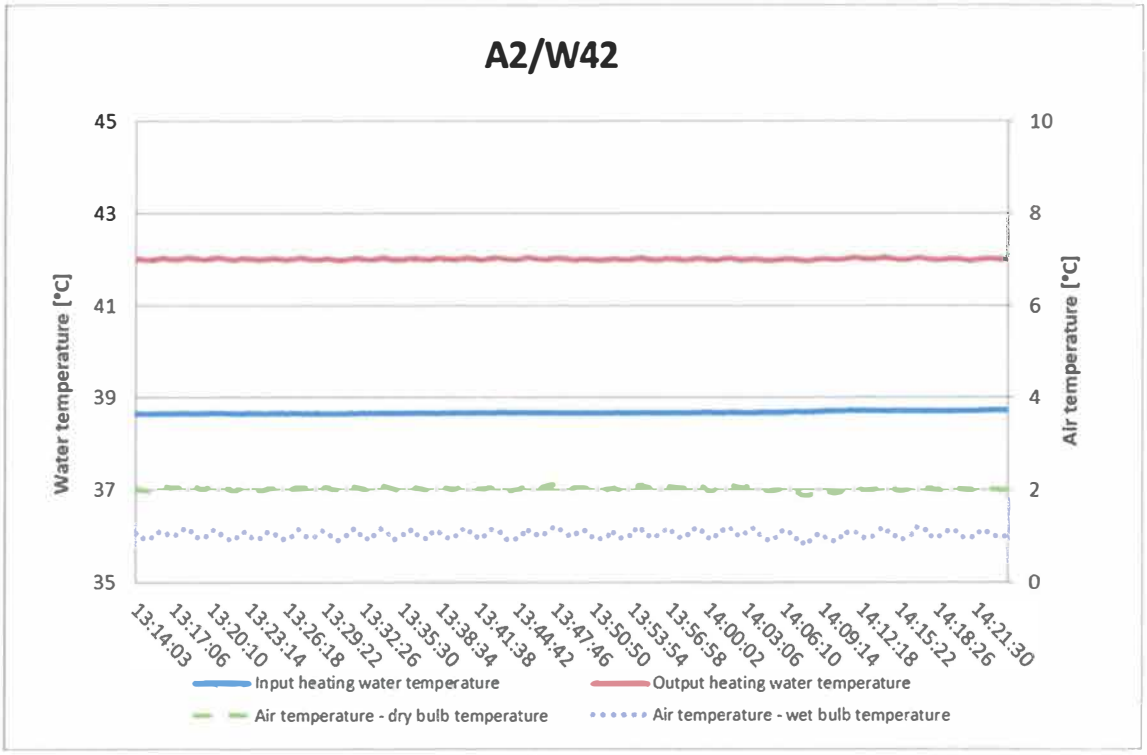
3. Seasonal performance tests and SCOP calculation – Medium temperature application

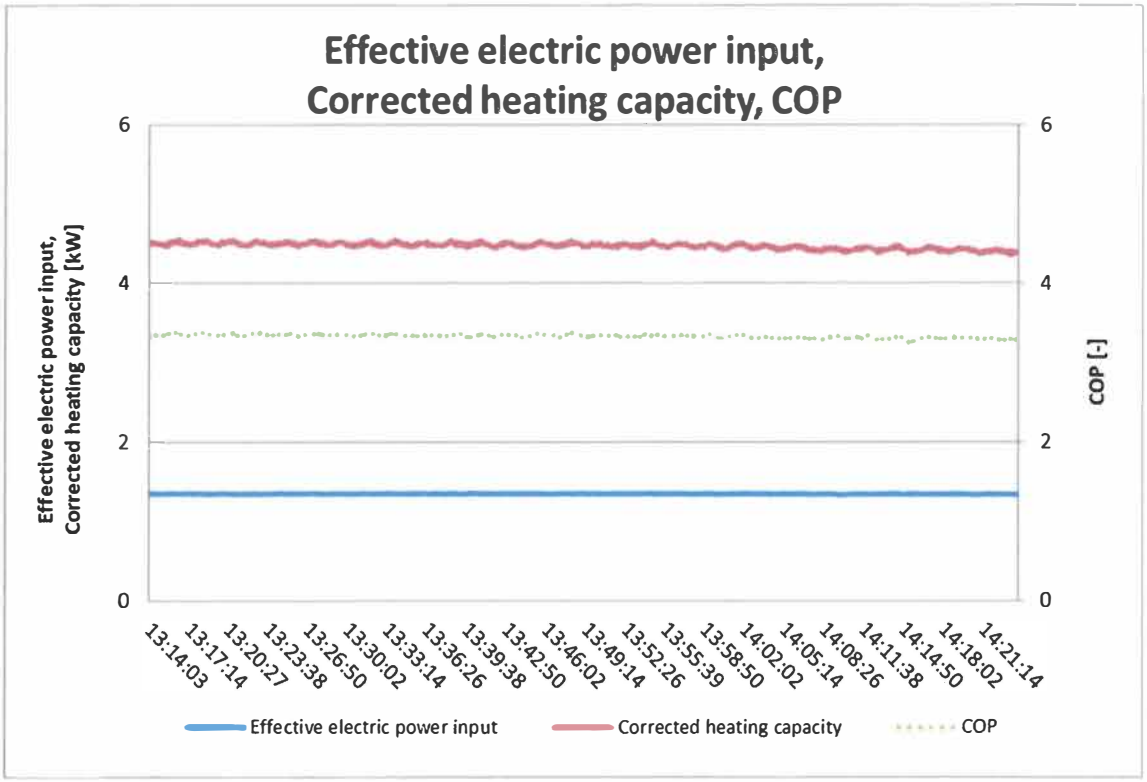
A-7/W52 (93 Hz)



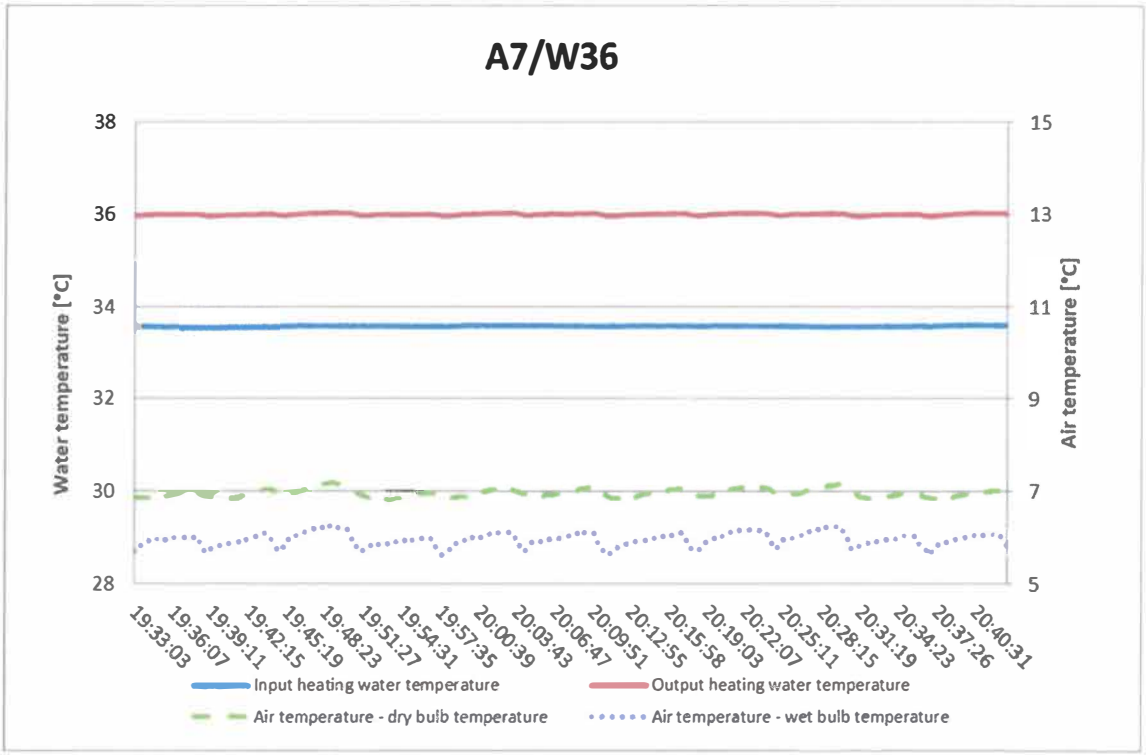


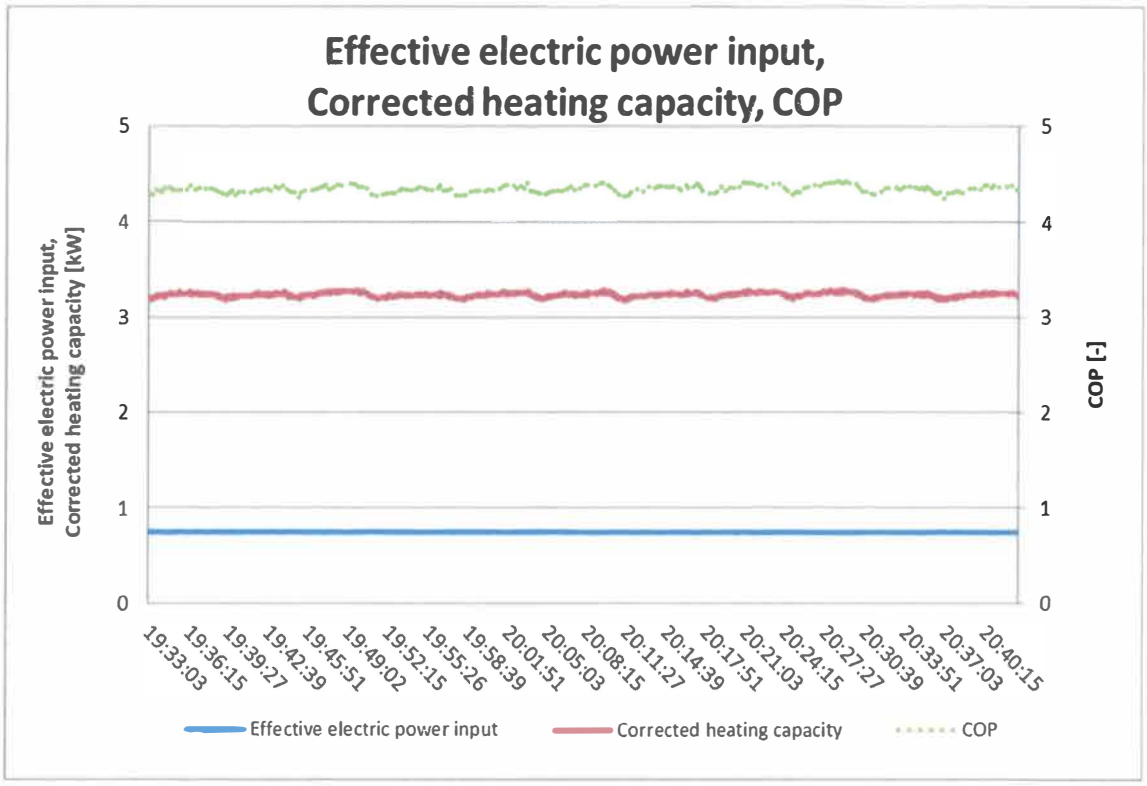
A2/W42 (41 Hz)


A2/W42
Water temperature [°C]
Air temperature [°C]
45
43
41
39
37
35
10
8
6
4
2
0
13:14:03
13:17:06
13:20:10
13:23:14
13:26:18
13:29:22
13:32:26
13:35:30
13:38:34
13:41:38
13:44:42
13:47:46
13:50:50
13:53:54
13:56:58
14:00:02
14:03:06
14:06:10
14:09:14
14:12:18
14:15:22
14:18:26
14:21:30
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

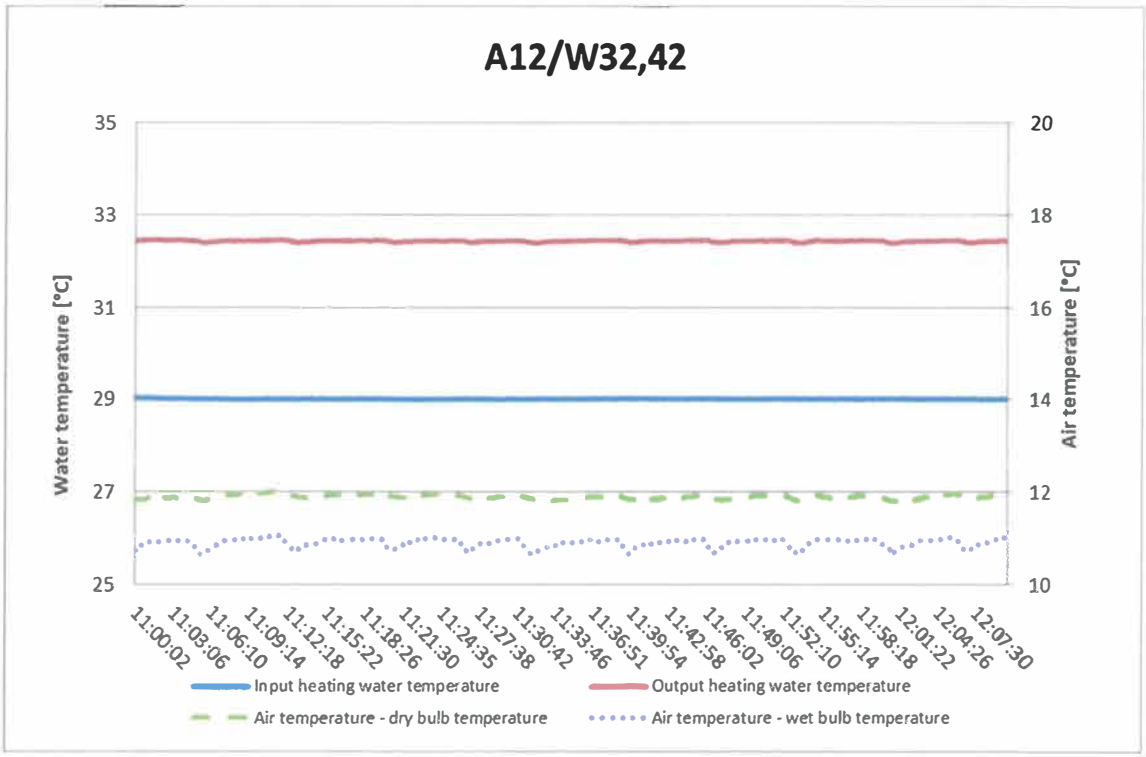

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
6
4
2
0
13:14:03
13:17:14
13:20:27
13:23:38
13:26:50
13:30:02
13:33:14
13:36:26
13:39:38
13:42:50
13:46:02
13:49:14
13:52:26
13:55:39
13:58:50
14:02:02
14:05:14
14:08:26
14:11:38
14:14:50
14:18:02
14:21:14
Effective electric power input
Corrected heating capacity
COP

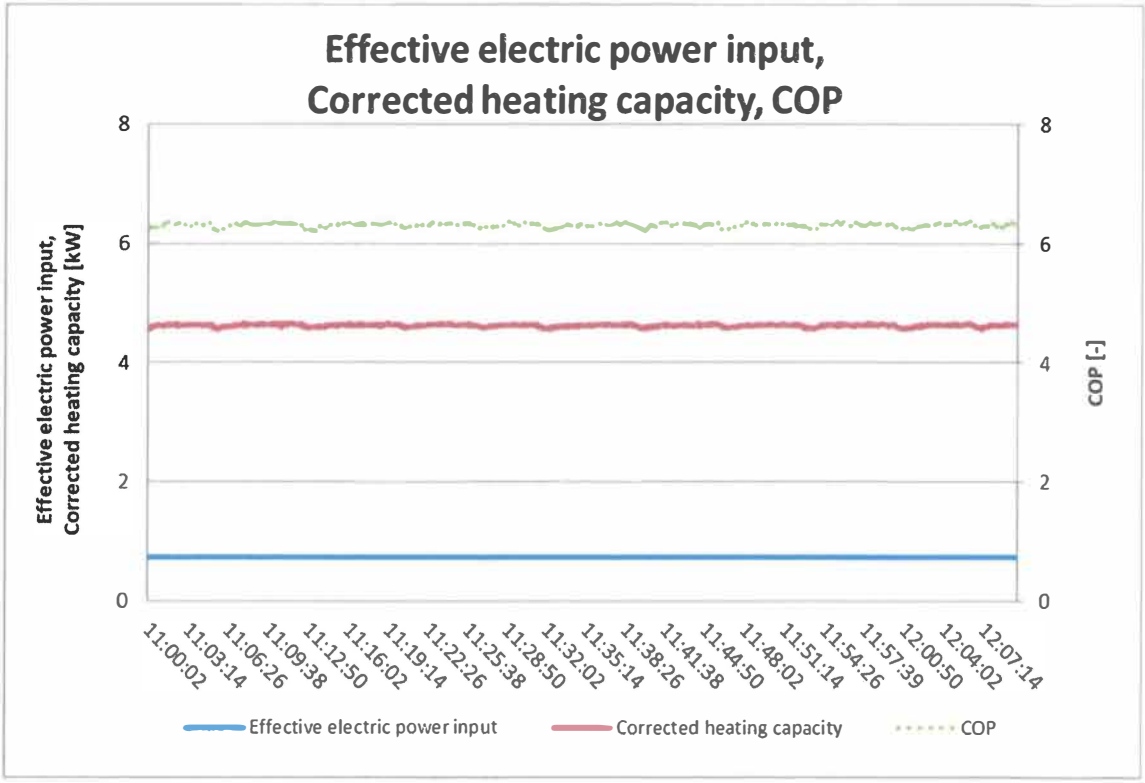
A7/W36 (26 Hz)


A7/W36
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
15
13
11
9
7
5
19:33:03
19:36:07
19:39:11
19:42:15
19:45:19
19:48:23
19:51:27
19:54:31
19:57:35
20:00:39
20:03:43
20:06:47
20:09:51
20:12:55
20:15:58
20:19:03
20:22:07
20:25:11
20:28:15
20:31:19
20:34:23
20:37:26
20:40:31
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

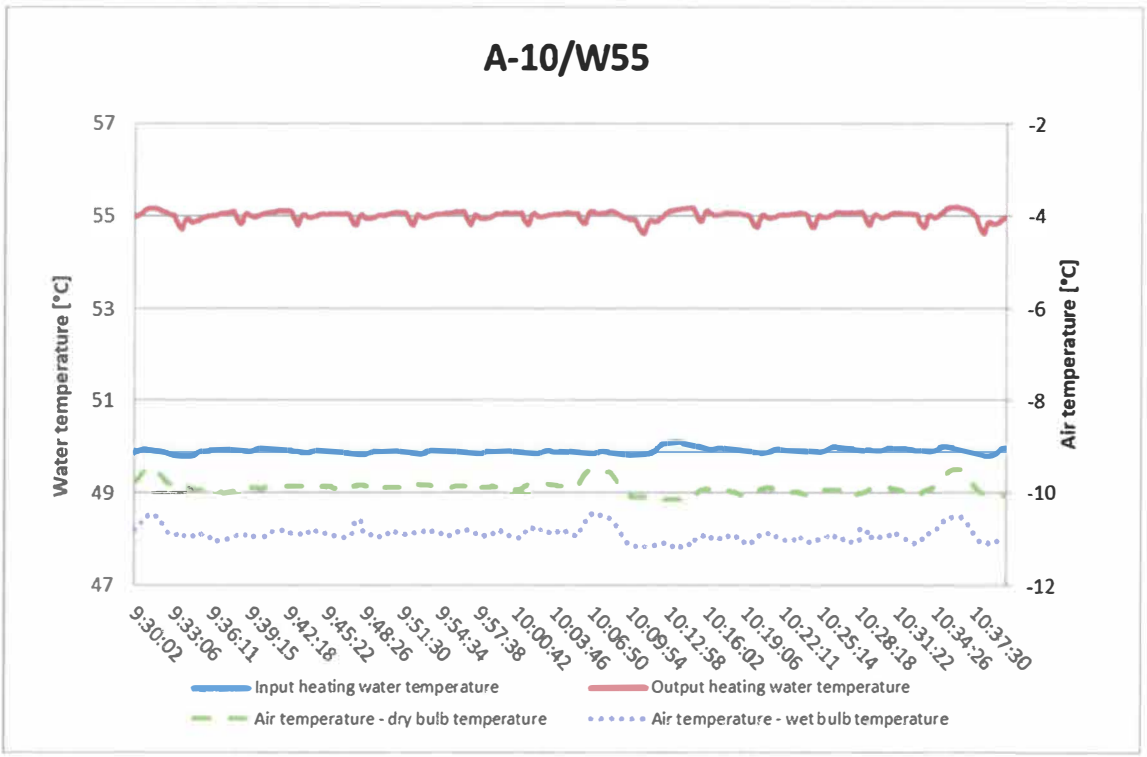

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
5
4
3
2
1
0
19:33:03
19:36:15
19:39:27
19:42:39
19:45:51
19:49:02
19:52:15
19:55:26
19:58:39
20:01:51
20:05:03
20:08:15
20:11:27
20:14:39
20:17:51
20:21:03
20:24:15
20:27:27
20:30:39
20:33:51
20:37:03
20:40:15
Effective electric power input
Corrected heating capacity
COP

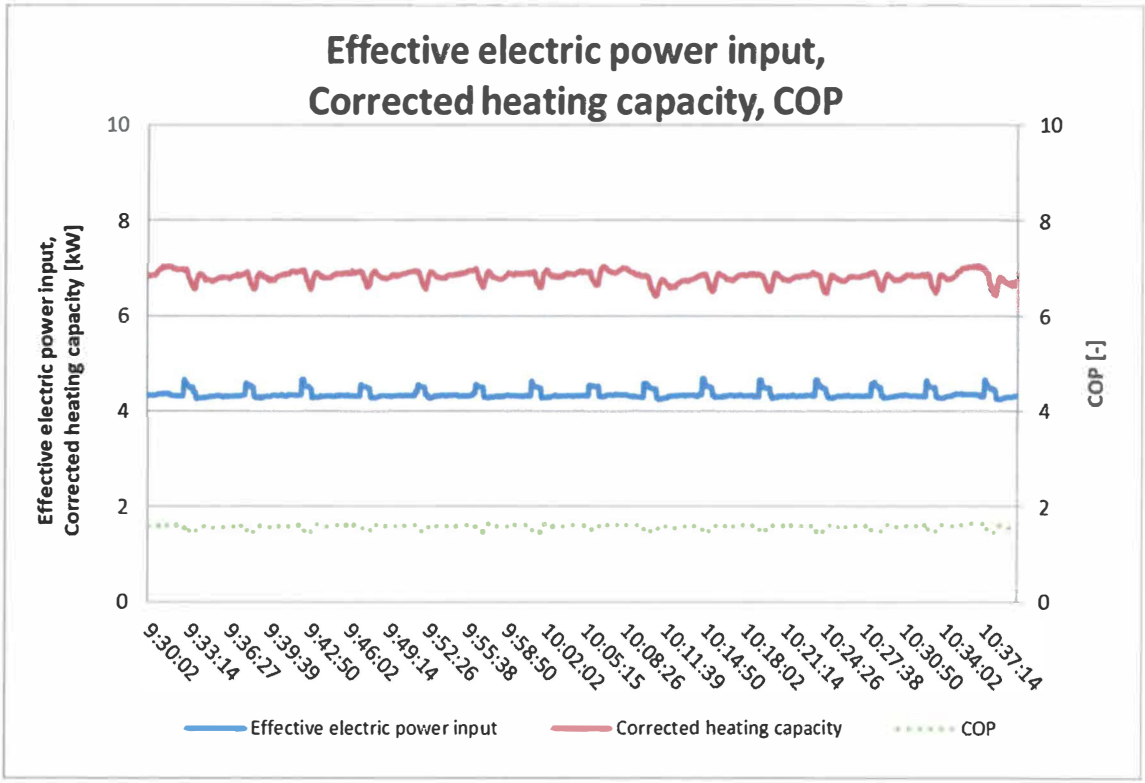
A12/W32.42 (30 Hz)





A-10/W55 (99 Hz)


A-10/W55
Water temperature [°C]
Air temperature [°C]
57
55
53
51
49
47
-2
-4
-6
-8
-10
-12
9:30:02
9:33:06
9:36:11
9:39:15
9:42:18
9:45:22
9:48:26
9:51:30
9:54:34
9:57:38
10:00:42
10:03:46
10:06:50
10:09:54
10:12:58
10:16:02
10:19:06
10:22:11
10:25:14
10:28:18
10:31:22
10:34:26
10:37:30
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature


Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
10
8
6
4
2
0
9:30:02
9:33:14
9:36:27
9:39:39
9:42:50
9:46:02
9:49:14
9:52:26
9:55:38
9:58:50
10:02:02
10:05:15
10:08:26
10:11:39
10:14:50
10:18:02
10:21:14
10:24:26
10:27:38
10:30:50
10:34:02
10:37:14
Effective electric power input
Corrected heating capacity
COP

VI. A list of referenced documents

- Order of 2024-08-02 (Order reg. no. B-82633, received on 2024-07-10)
- Contract B-82633/39
- ČSN EN 14511-2:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 2: Test conditions
- ČSN EN 14511-3:2024 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers with electrically driven compressors - Part 3: Test methods
- ČSN EN 14825:2023 - Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance

Test Report compiled by: Ing. Dominik Šedivý, Ph.D.

Test Report approved by: Ing. Mario Jankola
Heating Equipment and Construction Products Manager

– End of Test Report –

Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe, Brno, Republika Czeska
Engineering Test Institute. Public Enterprise. Brno. Czech Republic

CERTYFIKAT Z BADAŃ
TEST CERTIFICATE

Number **O-B-01604-24**

Producent *Customer*	Vidicon Sp. z o.o ul. Bema 7-9 50-265 Wrocław POLAND
Produkt *Product*	Pompa Ciepła powietrze/woda – split *Air/water heat pump – split*
Rodzaj oznaczenie / znak towarowy *Type designation / Trade mark*	**VDS-100W/EN8BP+VDS-100B/EN8BP**
Metoda testowa *Test methods*	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, ČSN EN 14825:2023; ČSN EN 12102-1:2023
Podstawy zaświadczenia *Basis of certificate*	Raport z badań - *Test reports*: 39-17904/T z dnia - *of* 2024-08-28 39-17904/H z dnia - *of* 2024-09-18 Dokumentacja techniczna przedstawiona przez - *Technical documents of* Vidicon Sp. z o.o
Referencyjny okres grzewczy *Reference heating season*	**„A" = Średni - *„A" = average*** (Warunki obliczeniowe odniesienia dla ogrzewania $T_{designh}$ = -10 °C - *Reference design temperature $T_{designh}$ = -10 °C*)

Wyniki - Results:

NISKA TEMPERATURA *LOW TEMPERATURE*		ŚREDNIA TEMPERATURA *MEDIUM TEMPERATURE*
Referencyjna temperatura wody 35 °C - *Reference water temperature 35 °C*		Referencyjna temperatura wody 55 °C - *Reference water temperature 55 °C*
8.50	**$P_{designh}$ [kW]** ... Obciążenie obliczeniowe dla trybu ogrzewania - *Full load heating*	**8.94**
4.45	**SCOP [-]** ... Wskaźnik sezonowej efektywności - *Seasonal coefficient of performance*	**3.40**

Temperatura zewnętrzna *Outdoor temperature* T_j [°C]	Deklarowana wydajność grzewcza *Heating declared capacity* P_{dh} [kW]	Wskaźnik efektywności dla deklarowanej wydajności *Coefficient of performance at the declared capacity* COP_d [–]	Temperatura zewnętrzna *Outdoor temperature* T_j [°C]	Deklarowana wydajność grzewcza *Heating declared capacity* P_{dh} [kW]	Wskaźnik efektywności dla deklarowanej wydajności *Coefficient of performance at the declared capacity* COP_d [–]
T_j = -7	7.519	2.777	T_j = -7	7.910	2.090
T_j = +2	4.871	4.339	T_j = +2	4.470	3.332
T_j = +7	3.778	5.805	T_j = +7	3.327	4.348
T_j = +12	3.749	7.361	T_j = +12	4.633	6.319
T_j = TOL = -10	7.398	2.535	T_j = TOL = -10	6.823	1.567
T_j = $T_{bivalent}$ = -7	7.519	2.777	T_j = $T_{bivalent}$ = -7	7.910	2.090

NISKA TEMPERATURA *LOW TEMPERATURE* Referencyjna temperatura wody 35 °C - *Reference water temperature 35 °C*		ŚREDNIA TEMPERATURA *MEDIUM TEMPERATURE* Referencyjna temperatura wody 55 °C - *Reference water temperature 55 °C*

Pobór mocy w trybach innych niż „tryb aktywny" - *Power consumption in modes other than „active mode"*

7.4	Tryb wyłączenia *Off mode*	P_{OFF}	[W]	7.4
5.5	Tryb wyłączonego termostatu *Thermostat off mode*	P_{TO}	[W]	5.5
7.4	Tryb czuwania *Standby mode*	P_{SB}	[W]	7.4
0.0	Tryb włączonej grzałki karteru *Crankcase heater mode*	P_{CK}	[W]	0.0

Roczne zużycie energii elektrycznej na potrzeby ogrzewania wg: - *Annual electricity consumption for heating according to:*

3946	ČSN EN 14825:2023	Q_{HE}	[kWh]	**5435**

Sezonowa efektywność energetyczna ogrzewania pomieszczeń - *Seasonal Space heating energy efficiency*

175.0	ČSN EN 14825:2023	η_s	[%]	**133.0**

Przepływ cieczy w zewnętrznym wymienniku ciepła - *Liquid flow rate in outdoor heating exchanger*

–	Ciecz obiegu źródła *Source liquid*	Min/Max	[m^3/h]	–

Przepływ cieczy w wewnętrznym wymienniku ciepła - *Liquid flow rate in indoor heating exchanger*

1.7342/1.7400	Woda grzewcza *Heating water*	Min/Max	[m^3/h]	1.1756/1.1892

Poziom mocy akustycznej dla warunków - Sound power level at condition A7W55* (at 26 Hz):

VDS-100W/EN8BP – Jednostka zewnętrzna – *– outdoor unit –*	L_{WA}	57.1 ± 1.5	dB(A)	Klasa dokładności 2 (Techniczna) *Accuracy class 2 (Engineering)*
VDS-100B/EN8BP – Jednostka wewnętrzna – *– indoor unit –*	L_{WA}	41.3 ± 3.0	dB(A)	Klasa dokładności 2 (Techniczna) *Accuracy class 2 (Engineering)*

(*) Uwagi do skróconych oznaczeń: np. A7/W55: A (powietrze), 7 (temperatura wejściowa - temperatura termometru suchego w °C), W (woda), 55 (temperatura wyjściowa w °C).
Comment to abbreviated marking: e.g. A7/W55: A (air), 7 (input air – dry bulb temperature in °C) / W (water), 55 (output heating water temperature in °C).

Specyfikacja warunków - *Specification of conditions*:

Kontrola prędkości kompresora *Compressor speed control*	**Zmienna** ***Variable***	Nominalne natężenie przepływu cieczy (wewnętrzny wymiennik ciepła) - *Rated liquid flow rate (indoor heat exchanger)*	**Stała** **Fixed**
Wylotowa temperatura wody (wewnętrzny wymiennik ciepła) - *Outlet water temperature (indoor heat*	**Zmienna** ***Variable***	Nominalne natężenie przepływu cieczy (zewnętrzny wymiennik ciepła) - *Rated liquid flow rate (outdoor heat exchanger)*	**Zmienna** ***Variable***
Funkcja *Function*	**Odwracalna** ***Reversible***		

Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe potwierdza niniejszym certyficatem z badań, że badanie produktu, którego dotyczy dało wyniki wskazane powyżej. Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe jest akredytowanym Laboratorium 1045.1.
Engineering Test Institute, Public Enterprise, confirms by this Test Certificate that the testing of the product in question was performed with the results as stated above. Engineering Test Institute, Public Enterprise, is an accredited Laboratory 1045.1.

Brno, 2024-09-23

Ing. Mario Jankola
Kierownik ds. Urządzeń Grzewczych i Wyrobów Budowlanych
Heating Equipment and Construction Products Manager
- KONIEC CERTYFIKATU Z BADAŃ -
- END OF TEST CERTIFICATE -

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

Strojírenský zkušební ústav, s.p., Hudcova 424/56b, 621 00 Brno, Česká republika
Engineering Test Institute, public enterprise, Hudcova 424/56b, 621 00 Brno, Czech Republic
www.szutest.cz

OŚWIADCZENIE

Producent Vidicon Sp. z o.o. oświadcza, iż pompy ciepła

1) Vesser Alterius Split - VDS-60B/EN8BP + VDS-60W/EN8BP
2) Vesser Alterius Split - VDS-80B/EN8BP + VDS-80W/EN8BP
3) Vesser Alterius Split - VDS-100B/EN8BP + VDS-100W/EN8BP
4) Vesser Alterius Split - VDS-120B/EN8SBP + VDS-120W/EN8SBP
5) Vesser Alterius Split - VDS-140B/EN8SBP + VDS-140W/EN8SBP

Należą do jednego podtypu w danym typoszeregu i spełniają łącznie następujące warunki:

- identyczna konstrukcja obiegu chłodniczego, ten sam czynnik chłodniczy/roboczy;
- ten sam producent, typ i liczba sprężarek;
- ten sam typ elementu rozprężnego;
- ten sam typ skraplacza;
- ten sam typ parownika;
- ten sam typ procesu odszraniania;
- ten sam sterownik i zasada sterowania wydajnością;
- ten sam producent, typ i liczba wentylatorów parownika (w przypadku powietrznych pomp ciepła) i zasada sterowania wydajnością (stała, zmienna lub stopniowana regulacja prędkości obrotowej);
- urządzenia z i bez zaworu czterodrogowego nie mogą być zaliczone do tego samego typoszeregu.

Wiceprezes Zarządu

Dariusz Witek

Warszawa, 30.09.2024

Miejscowość, data

Podpis osoby upoważnionej

VIDICON Sp. z o.o.
50-265 Wrocław, ul. Bema 7-9
I Oddział w Warszawie
01-797 Warszawa, ul. Powązkowska 15
tel. (22) 562-30-00
NIP: 899-010-67-52

Marcin Kotlicki
Tłumacz przysięgły języka angielskiego
Wpisany do rejestru tłumaczy przysięgłych Ministerstwa Sprawiedliwości
pod numerem TP/32/12

Tłumaczenie przysięgłe z języka angielskiego

[logo]

Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe, Brno, Republika Czeska

CERTYFIKAT Z BADAŃ
Numer **O-B-01604-24**

Klient	Vidicon Sp. z o.o. ul. Bema 7-9 50-265 Wrocław POLSKA
Produkt	Pompa ciepła powietrze/woda – split
Oznaczenie typu/Znak towarowy	**VDS-100W/EN8BP+VDS-100B/EN8BP**
Metody badań	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, ČSN EN 14825:2023; ČSN EN 12102-1:2023
Podstawa wydania świadectwa	Sprawozdania z badań: 39-17904/T z dnia 2024-08-28 29-17904/H z dnia 2024-09-18 Dokumentacja techniczna przedstawiona przez Vidicon Sp. z o.o.
Referencyjny sezon grzewczy	**„A" = średni** (referencyjne warunki obliczeniowe dla ogrzewania $T_{designh}$=-10 °C)

Wyniki:

NISKA TEMPERATURA (Referencyjna temperatura wody 35°C)		**ŚREDNIA TEMPERATURA** (Referencyjna temperatura wody 55°C)
8,50	$P_{designh}$ [kW] ... Obciążenie obliczeniowe dla trybu ogrzewania	**8,94**
4,45	SCOP [-] ... Wskaźnik sezonowej efektywności	**3,40**

Temperatura zewnętrzna T_j [°C]	Deklarowana wydajność grzewcza P_{dh} [kW]	Współczynnik efektywności dla deklarowanej wydajności COP_d [-]	Temperatura zewnętrzna T_j [°C]	Deklarowana wydajność grzewcza P_{dh} [kW]	Współczynnik efektywności dla deklarowanej wydajności COP_d [-]
T_j = -7	7,519	2,777	T_j = -7	7,910	2,090
T_j = +2	4,871	4,339	T_j = +2	4,470	3,332
T_j = +7	3,778	5,805	T_j = +7	3,327	4,348
T_j = +12	3,749	7,361	T_j = +12	4,633	6,319
T_j = TOL = -10	7,398	2,535	T_j = TOL = -10	6,823	1,567
T_j - $T_{bivalent}$ = -7	7,519	2,777	T_j - $T_{bivalent}$ = -7	7,910	2,090

[hologram]

Strojírenský zkušební ústav, s.p. Hudcova 424/56b, 621 00 Brno, Česká republika
Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska
www.szutest.cz

[pieczątka z logo i słowami „Strojírenský zkušební ústav, s.p., CZ1" w otoku]

[logo]

NISKA TEMPERATURA (referencyjna temperatura wody 35°C)				ŚREDNIA TEMPERATURA (referencyjna temperatura wody 55°C)
Pobór mocy w trybach innych niż „tryb aktywny"				
7,4	Tryb wyłączenia	P_{OFF} [W]		7,4
5,5	Tryb wyłączonego termostatu	P_{TO} [W]		5,5
7,4	Tryb czuwania	P_{SB} [W]		7,4
0,0	Tryb włączonej grzałki karteru	P_{CK} [W]		0,0
Roczne zużycie energii elektrycznej na potrzeby ogrzewania wg:				
3946	ČSN EN 14825:2023	Q_{HE} [kWh]		5435
Sezonowa efektywność energetyczna ogrzewania pomieszczeń				
175,0	ČSN EN 14825:2023	η_s [%]		133,0
Przepływ cieczy w zewnętrznym wymienniku ciepła				
-	Ciecz obiegu źródła	min/max [m^3/h]		-
Przepływ cieczy w zewnętrznym wymienniku ciepła				
1,7342/1,7400	Woda grzewcza	min/max [m^3/h]		1,1756/1,1892

Poziom mocy akustycznej dla warunków A7W55* (przy 26 Hz):

VDS-100W/EN8BP -jednostka zewnętrzna-	L_{WA}	57,1 ± 1,5	dB(A)	Klasa dokładności 2 (techniczna)
VDS-100B/EN8BP -jednostka wewnętrzna-	L_{WA}	41,3 ± 3,0	dB(A)	Klasa dokładności 2 (techniczna)

(*) Uwagi do skróconych oznaczeń, np. A7/W55: A (powietrze), 7 (temperatura wejściowa – temperatura termometru suchego w °C), W (woda), 55 (temperatura wyjściowa w °C)

Specyfikacja warunków:

Sterowanie prędkością sprężarki	**Zmienne**	Nominalne natężenie przepływu cieczy (wewnętrzny wymiennik ciepła)	**Stałe**
Wylotowa temperatura wody (wewnętrzny wymiennik ciepła)	**Zmienna**	Nominalne natężenie przepływu cieczy (zewnętrzny wymiennik ciepła)	**Zmienne**
Praca	**Odwracalna**		

Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe, poprzez wydanie niniejszego Certyfikatu Badania potwierdza, że na podstawie badania danego produktu uzyskano wyniki podane powyżej. Instytut Badań Inżynieryjnych, Przedsiębiorstwo Państwowe, jest akredytowanym Laboratorium Badawczym nr 1045.1.

Brno, 2024-09-23

[nieczytelny podpis]
Ing. Mario Jankola
Kierownik ds. Urządzeń Grzewczych i Wyrobów Budowlanych

[pieczątka z logo i słowami „Strojírenský zkušební ústav, s.p., CZ1" w otoku]

- KONIEC CERTYFIKATU BADAŃ -

Strojírenský zkušební ústav, s.p. Hudcova 424/56b, 621 00 Brno, Česká republika
Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska
www.szutest.cz

Niniejszym potwierdzam zgodność powyższego tłumaczenia z przedłożonym mi skanem dokumentu w języku angielskim.
Poznań, dnia 15 października 2024 r.
Tłumacz przysięgły języka angielskiego Marcin Kotlicki
Nr TP/32/12
ul. Rataje 162/13, 61-168 Poznań
nr rep 1039/2024

TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/32/12