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
39-17905/1/T

Product: Outdoor Air/Water Heat Pumps - monobloc

Type designation: **Neoheat Eko Mono 15 (R290)**

Customer:
IGLOTECH Sp. Z O.O.
Toruńska 41
82-500 Kwidzyn
POLAND

Manufacturer:
IGLOTECH Sp. Z O.O.
Toruńska 41
82-500 Kwidzyn
POLAND

Report issue date: 2024-10-16

Distribution list:
1 copy to the Customer
1 copy to the Engineering Test Institute

I. Description of product tested

The Heat pump **Neoheat Eko Mono 15 (R290)** supplied by the company **IGLOTECH Sp. Z O.O.** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor and indoor hydrobox hanging on inner wall. Outdoor and indoor units are connected by water pipes. Refrigerant R290 is used with charge 1.5 kg. Power supply is a three-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with fixed flow rate.

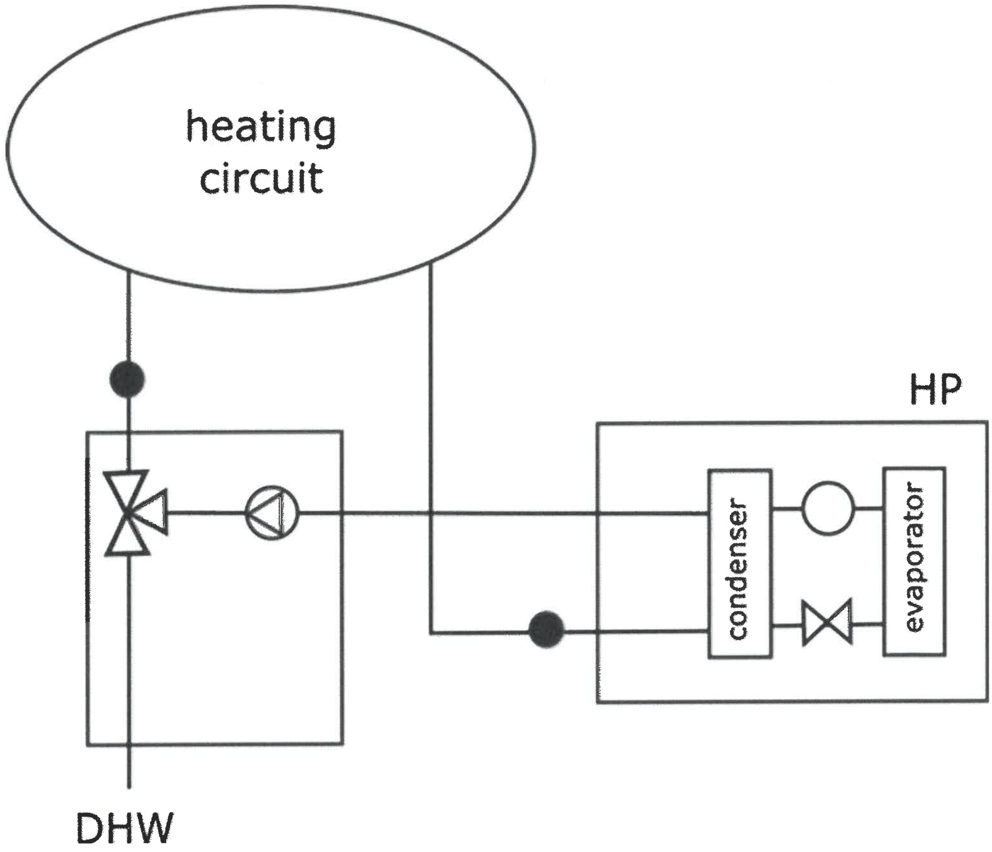
Main components of the outdoor unit **Neoheat Eko Mono 15 (R290):**

- Serial number AN0278-OD-3016
- Cubic shape with dimensions 1080 × 390 × 1440 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2.5 rows, dimensions 1000 × 55/45 × 1380 mm (W × D × H), spacing 2 mm
- Plate condenser SWEP, dimensions 130 × 140 × 530 mm (W × D × H) including insulation
- Compressor Highly WHP13300PSDPC8FQ
- Refrigerant R290 (1.5 kg)
- Electric expansion valve
- 4-way reversing valve Sanhua SHF-20D-46-02 Y92002
- Refrigerant accumulator
- 2x Axial fan Ø53 cm Nidec
- Pressure sensors
- Temperature sensors
- Refrigerant pipes
- Air vent
- Heat exchanger/accumulator

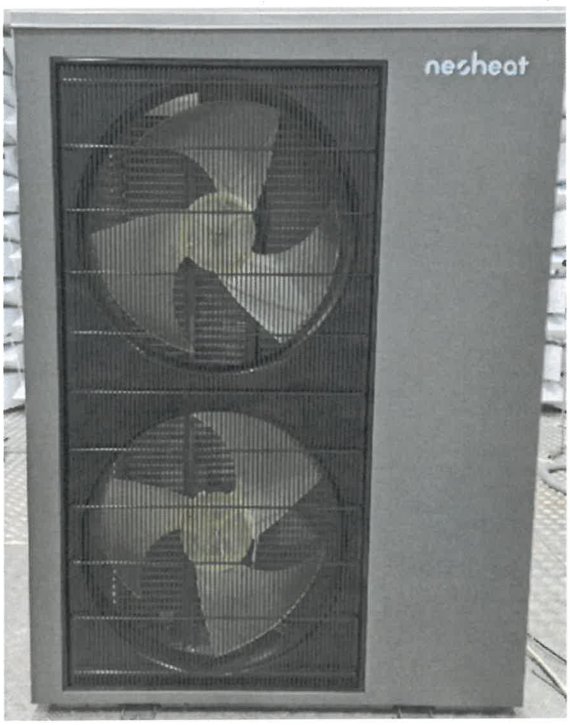
Main components of the indoor unit **Neoheat Eko Mono 15 (R290):**

- Serial number AN0278-ID-3008
- Cubic shape with dimensions 550 × 240 × 570 mm (W × D × H)
- Frame and casing made of varnished steel
- Electric backup heater
- Circulation pump Shinhoo
- 3-way valve
- Display
- Air vent
- Temperature sensors
- Software
- Flow sensor
- Pressure gauge with relief valve

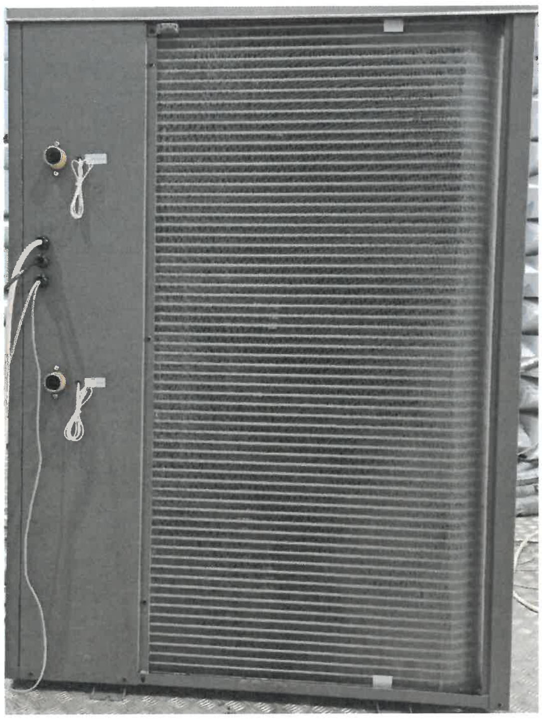
Scheme:



Photodocumentation:



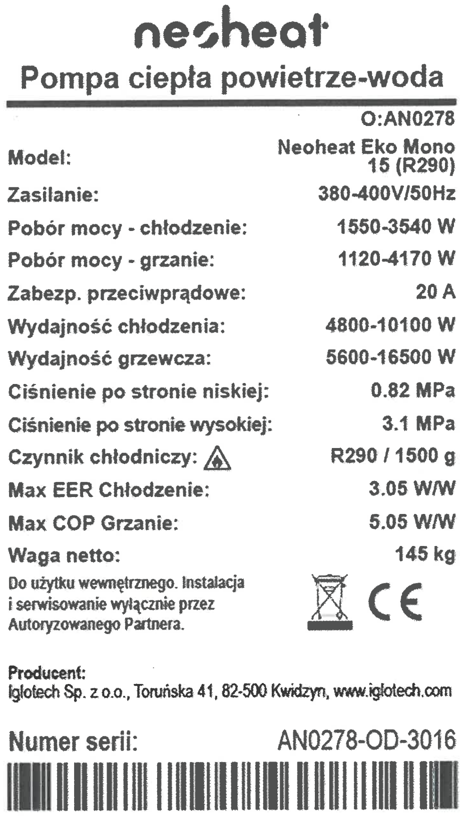
Heat pump **Neoheat Eko Mono 15 (R290)** – outdoor unit
– Front view –



Heat pump **Neoheat Eko Mono 15 (R290)** – outdoor unit
– Back view –

Not recognised

Heat pump **Neoheat Eko Mono 15 (R290)** – outdoor unit
– Compressor label –



neoheat

Pompa ciepła powietrze-woda

O:AN0278

Model:	Neoheat Eko Mono 15 (R290)
Zasilanie:	380-400V/50Hz
Pobór mocy - chłodzenie:	1550-3540 W
Pobór mocy - grzanie:	1120-4170 W
Zabezp. przeciwprądowe:	20 A
Wydajność chłodzenia:	4800-10100 W
Wydajność grzewcza:	5600-16500 W
Ciśnienie po stronie niskiej:	0.82 MPa
Ciśnienie po stronie wysokiej:	3.1 MPa
Czynnik chłodniczy:	R290 / 1500 g
Max EER Chłodzenie:	3.05 W/W
Max COP Grzanie:	5.05 W/W
Waga netto:	145 kg

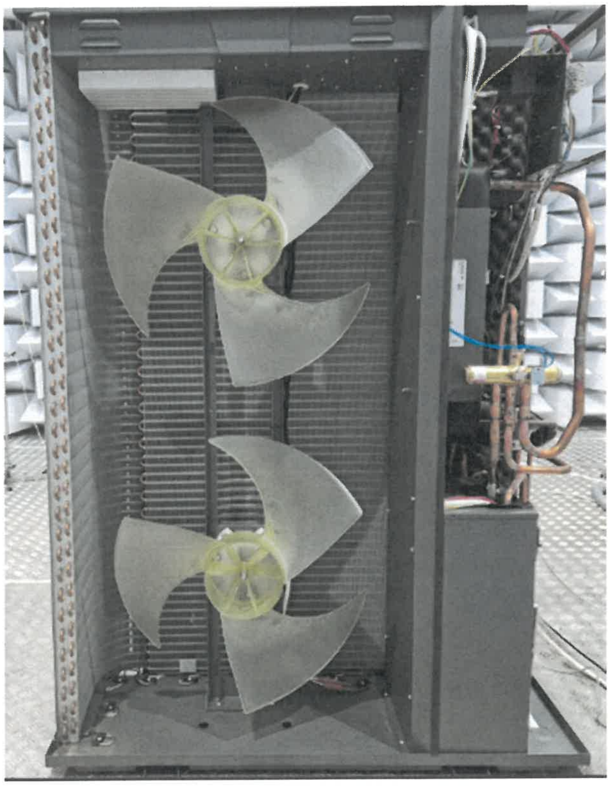
Do użytku wewnętrznego. Instalacja i serwisowanie wyłącznie przez Autoryzowanego Partnera.

CE

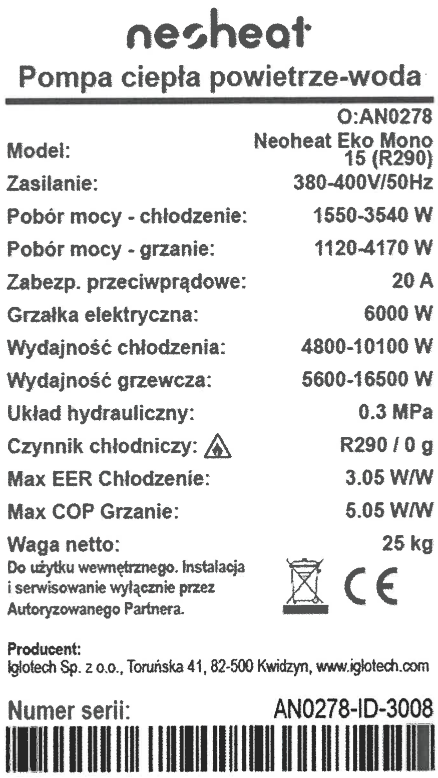
Producent:
Iglotech Sp. z o.o., Toruńska 41, 82-500 Kwidzyn, www.iglotech.com

Numer serii: AN0278-OD-3016

Heat pump **Neoheat Eko Mono 15 (R290)** – outdoor unit
– Label –



Heat pump **Neoheat Eko Mono 15 (R290)** – outdoor unit
– Without cover –



neoheat

Pompa ciepła powietrze-woda

O:AN0278

Model:	Neoheat Eko Mono 15 (R290)
Zasilanie:	380-400V/50Hz
Pobór mocy - chłodzenie:	1550-3540 W
Pobór mocy - grzanie:	1120-4170 W
Zabezp. przeciwprądowe:	20 A
Grzałka elektryczna:	6000 W
Wydajność chłodzenia:	4800-10100 W
Wydajność grzewcza:	5600-16500 W
Układ hydrauliczny:	0.3 MPa
Czynnik chłodniczy:	R290 / 0 g
Max EER Chłodzenie:	3.05 W/W
Max COP Grzanie:	5.05 W/W
Waga netto:	25 kg

Do użytku wewnętrznego. Instalacja i serwisowanie wyłącznie przez Autoryzowanego Partnera.

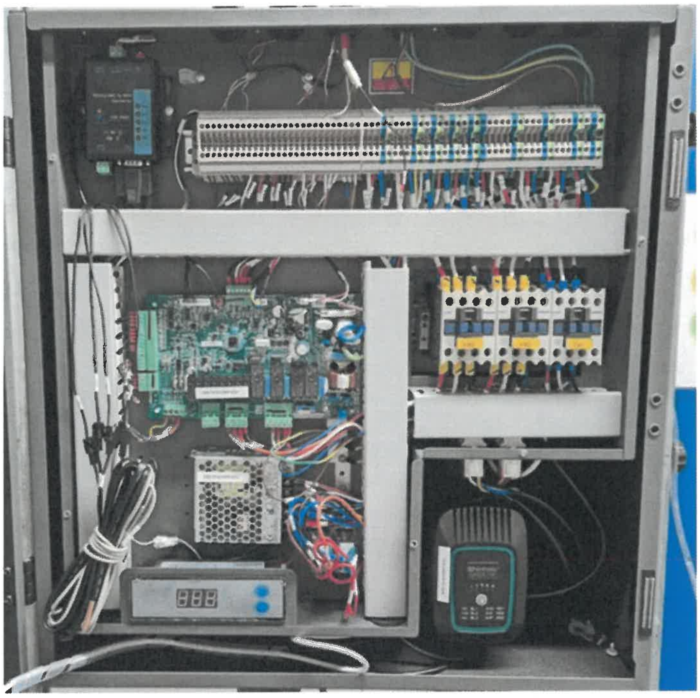
CE

Producent:
Iglotech Sp. z o.o., Toruńska 41, 82-500 Kwidzyn, www.iglotech.com

Numer serii: AN0278-ID-3008

Heat pump **Neoheat Eko Mono 15 (R290)** – indoor unit
– Label –

Heat pump **Neoheat Eko Mono 15 (R290)** – indoor unit
– With cover –



Heat pump **Neoheat Eko Mono 15 (R290)** – indoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.40408.001-002	**Neoheat Eko Mono 15 (R290)**	2024-08-21

The visual inspection, tests and verification were carried out by Ing. Tomáš Sedláček 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	E1.1
2.	Digital watt meter	1.2.1 ENERGIE ANALYZATOR_1
3.	Flow meter Krohne Optiflux	8.1.1 TECH_K1_V_DN15
4.	Barometer	2.4 MAR18_1_PB
5.	Differential pressure gauge	2.2 MAR18_1_dP
6.	Temperature-humidity meter HF532	2.1.1 K1_VLHKOST_1
7.	Temperature-humidity meter HF532	2.1.3 K1_VLHKOST_2
8.	Thermometers	2.4 MAR18_T

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 14511-3:2023	Page No. 8	x
2.	Seasonal performance tests and SCOP calculation – Low temperature application	–	ČSN EN 14511-3:2023 ČSN EN 14825:2023	Page No. 9 - 15	x
3.	Seasonal performance tests and SCOP calculation – Medium temperature application	–	ČSN EN 14511-3:2023 ČSN EN 14825:2023	Page No. 16 - 22	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 14511-3:2023
Sample tested:	Heat pump **Neoheat Eko Mono 15 (R290)**
Measuring equipment used:	see Chapter III

Specification of the assessment condition		**A7/W35**	**A7/W55**
Date of testing		**2024-08-27**	**2024-08-27**
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]	34.99	54.88
Input heating water – temperature calculation	[°C]	29.99	46.89
Output heating water temperature	[°C]	34.99	54.88
Input heating water temperature	[°C]	29.99	46.89
Air temperature – dry bulb temperature	[°C]	7.02	6.99
Air temperature – wet bulb temperature	[°C]	6.02	6.01
Relative humidity	[%]	86.90	86.98
Barometric pressure	[kPa]	98.975	99.099
Ambient temperature	[°C]	7.18	7.15
Secondary circuit pressure difference	[kPa]	0.048	14.233
Efficiency of the secondary liquid pump	[–]	0.113	0.181
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.7980	1.3611
Density of heating water	[$kg \cdot m^{-3}$]	993.9	985.8
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.179
Voltage	[V]	401.54	401.15
Total current	[A]	11.45	21.53
Overall power input	[kW]	2.122	4.405
Capacity correction of sec. liquid pump	[W]	0.185	24.430
Power input correction of sec. liquid pump	[W]	0.21	29.81
Heating capacity – heating water	[kW]	10.334	12.501
Corrected heating capacity – heating water	**[kW]**	**10.334**	**12.476**
Uncertainty of corrected heating capacity	[kW]	± 0.179	± 0.138
Effective electric power input	**[kW]**	**2.122**	**4.375**
COP	**[–]**	**4.869**	**2.851**
Uncertainty of COP	[–]	± 0.085	± 0.032
Control settings	**[Hz]**	**55**	**77**
Circulation pump settings – heating water	[–]	Low	Low

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 14511-3:2023, ČSN EN 14825:2023
Sample tested:	Heat pump **Neoheat Eko Mono 15 (R290)**
Measuring equipment used:	see Chapter III

Design	Air / water – monobloc				
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	**190.2**	%
		Warmer	η_s	–	%
		Colder	η_s	–	%
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**	**4.83**	–
		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	$P_{designh}$	**12.83**	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}	5487	kWh
		Warmer	Q_{HE}	–	kWh
		Colder	Q_{HE}	–	kWh
Modes other than „active mode“	Off mode		P_{OFF}	18.9	W
	Thermostat off mode		P_{TO}	23.4	W
	Standby mode		P_{SB}	18.9	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}	0.0234	[kW]
P_{SB}	0.0189	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0189	[kW]
$P_{designh}$	12.83	[kW]
$SCOP_{ON}$	4.83	[–]

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]

$Q_H = 12.83 \cdot 2066 = 26505$ [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]

$Q_{HE} = 26505 / 4.83 + 178 \cdot 0.0234 + 0 \cdot 0.0189 + 178 \cdot 0 + 0 \cdot 0.0189 = 5487$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 26505 / 5487 = 4.83$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

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

$\eta_s / A = (1 / 2.5) * 4.83 – 0.03 =$ **1.902** [–]

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/W27.79**
Date of testing		**2024-08-29**	**2024-09-02**	**2024-08-30**
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]	34.06	30.00	27.83
Input heating water – temperature calculation	[°C]	28.57	26.88	24.91
Output heating water temperature	[°C]	34.06	30.00	27.83
Input heating water temperature	[°C]	28.57	26.88	24.91
Air temperature – dry bulb temperature	[°C]	-7.00	1.97	7.01
Air temperature – wet bulb temperature	[°C]	-7.96	1.05	6.02
Relative humidity	[%]	75.75	85.15	86.93
Barometric pressure	[kPa]	98.582	98.237	98.596
Ambient temperature	[°C]	-6.99	2.03	7.10
Secondary circuit pressure difference	[kPa]	-0.015	-0.065	-0.299
Efficiency of the secondary liquid pump	[–]	0.112	0.113	0.114
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.7980	1.7980	1.8017
Density of heating water	[$kg \cdot m^{-3}$]	994.2	995.5	996.1
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.176	4.177
Voltage	[V]	401.36	402.33	402.97
Total current	[A]	18.15	7.64	5.61
Overall power input	[kW]	3.644	1.369	0.954
Capacity correction of sec. liquid pump	[W]	-0.059	-0.254	-1.159
Power input correction of sec. liquid pump	[W]	-0.07	-0.29	-1.31
Heating capacity – heating water	[kW]	11.349	6.463	6.068
Corrected heating capacity – heating water	**[kW]**	**11.349**	**6.463**	**6.069**
Uncertainty of corrected heating capacity	[kW]	± 0.180	± 0.177	± 0.178
Effective electric power input	**[kW]**	**3.644**	**1.369**	**0.956**
COP	**[–]**	**3.114**	**4.722**	**6.351**
Uncertainty of COP	[–]	± 0.049	± 0.130	± 0.186
Control settings	**[Hz]**	**90**	**40**	**30**
Circulation pump settings – heating water	[–]	Low	Low	Low

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/W26.33**	**A-10/W35**
Date of testing		**2024-08-30**	**2024-08-29**
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]	26.28	34.90
Input heating water – temperature calculation	[°C]	23.02	29.86
Output heating water temperature	[°C]	26.28	34.90
Input heating water temperature	[°C]	23.02	29.86
Air temperature – dry bulb temperature	[°C]	12.01	-9.96
Air temperature – wet bulb temperature	[°C]	11.00	-10.76
Relative humidity	[%]	88.93	75.91
Barometric pressure	[kPa]	98.630	98.719
Ambient temperature	[°C]	12.17	-10.00
Secondary circuit pressure difference	[kPa]	-0.340	0.041
Efficiency of the secondary liquid pump	[–]	0.114	0.113
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.8012	1.7980
Density of heating water	[$kg \cdot m^{-3}$]	996.5	994.0
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.177	4.175
Voltage	[V]	402.40	401.12
Total current	[A]	5.06	17.98
Overall power input	[kW]	0.871	3.603
Capacity correction of sec. liquid pump	[W]	-1.315	0.159
Power input correction of sec. liquid pump	[W]	-1.48	0.18
Heating capacity – heating water	[kW]	6.783	10.429
Corrected heating capacity – heating water	**[kW]**	**6.784**	**10.429**
Uncertainty of corrected heating capacity	[kW]	± 0.178	± 0.179
Effective electric power input	**[kW]**	**0.872**	**3.603**
COP	**[–]**	**7.777**	**2.895**
Uncertainty of COP	[–]	± 0.204	± 0.050
Control settings	**[Hz]**	**30**	**90**
Circulation pump settings – heating water	[–]	Low	Low

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	11.35	11.349	3.114	0.900	1.00	3.114	–
B	2	30.00	53.85	6.91	6.463	4.722	0.900	1.00	4.722	–
C	7	27.79	34.62	4.44	6.069	6.351	0.976	0.73	6.294	0.0234
D	12	26.33	15.38	1.97	6.784	7.777	0.973	0.29	7.300	0.0234
TOL (E)	-10	35.00	100.00	12.83	10.429	2.895	0.900	1.00	2.895	–
Tbiv (F)	-7	34.00	88.46	11.35	11.349	3.114	0.900	1.00	3.114	–

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:

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

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

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

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

For fixed flow:

Δt = Declared capacity / Declared capacity $_{\text{standard rating conditions A7W35}}$ · 5

CR · Δt = Part load / Declared capacity · Declared capacity / Declared capacity$_{\text{standard rating conditions A7W35}}$ · 5

CR · Δt = Part load / Declared capacity $_{\text{standard rating conditions A7W35}}$ · 5

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

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

Measured data:

$t_{\text{outlet, average}}$	24.00	[°C]
Declared capacity	6.784	[kW]
Declared capacity $_{\text{standard rating condition A7/W35}}$	10.334	[kW]
Part load	1.97	[kW]

Calculation of water temperature

$t_{\text{outlet, capacity test, fixed flow}}$ = 24 + 5 / 10.334 · (6.784 – 1.97) = **26.33** [°C]

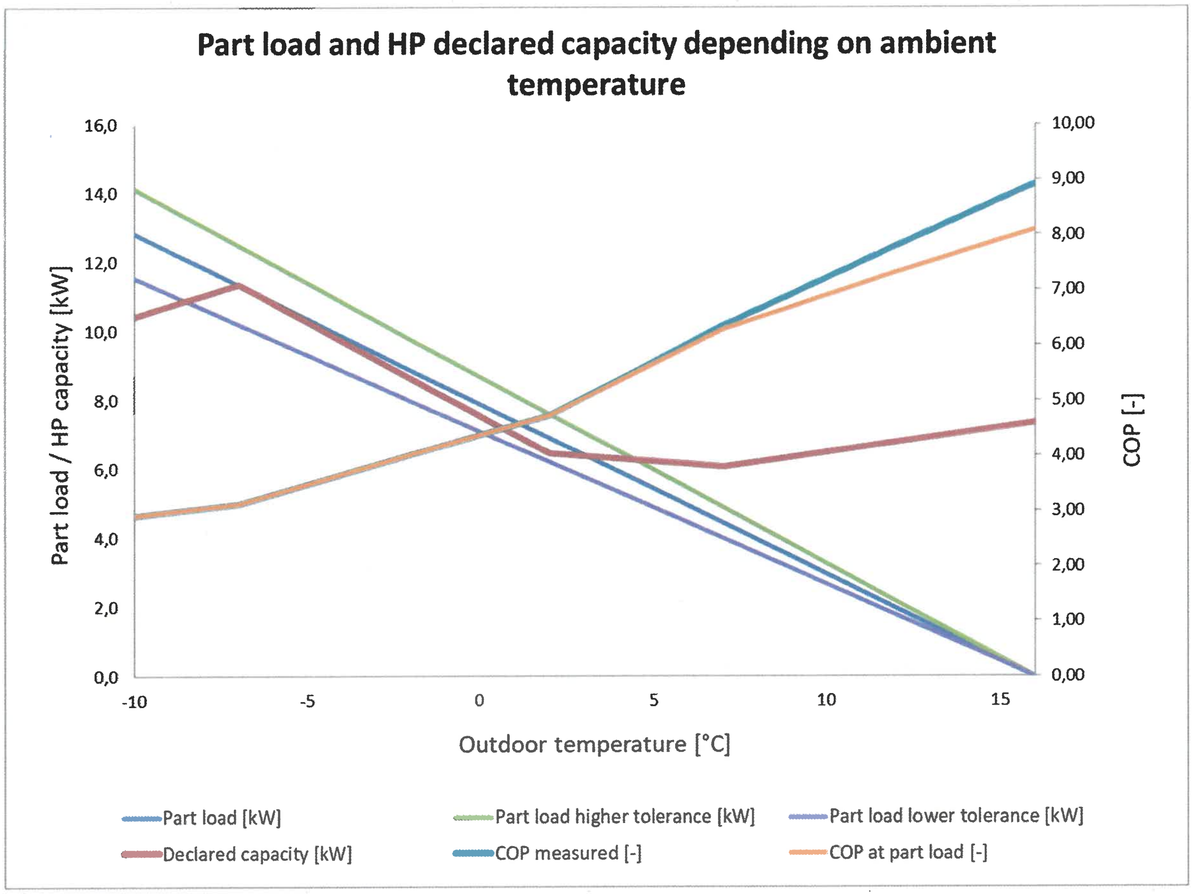
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$

- 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) COPb in (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**	**12.83**	**10.43**	**10.43**	**2.40**	**2.40**	**2.90**	**13**	**6**	**10**	**4**
	22	-9	25	96.15	12.34	10.74	10.74	1.60	40.01	2.97	308	130	268	90
	23	-8	23	92.31	11.84	11.04	11.04	0.80	18.40	3.04	272	102	254	84
A, Tbiv (F)	**24**	**-7**	**24**	**88.46**	**11.35**	**11.35**	**11.35**	**0.00**	**0.00**	**3.11**	**272**	**87**	**272**	**87**
	25	-6	27	84.62	10.86	10.81	10.81	0.00	0.00	3.29	293	89	293	89
	26	-5	68	80.77	10.36	10.26	10.26	0.00	0.00	3.47	705	203	705	203
	27	-4	91	76.92	9.87	9.72	9.72	0.00	0.00	3.65	898	246	898	246
	28	-3	89	73.08	9.38	9.18	9.18	0.00	0.00	3.83	834	218	834	218
	29	-2	165	69.23	8.88	8.63	8.63	0.00	0.00	4.01	1466	366	1466	366
	30	-1	173	65.38	8.39	8.09	8.09	0.00	0.00	4.19	1451	347	1451	347
	31	0	240	61.54	7.89	7.55	7.55	0.00	0.00	4.36	1895	434	1895	434
	32	1	280	57.69	7.40	7.01	7.01	0.00	0.00	4.54	2072	456	2072	456
B	**33**	**2**	**320**	**53.85**	**6.91**	**6.46**	**6.46**	**0.00**	**0.00**	**4.72**	**2211**	**468**	**2211**	**468**
	34	3	357	50.00	6.41	6.38	6.38	0.00	0.00	5.04	2290	455	2290	455
	35	4	356	46.15	5.92	6.31	5.92	0.00	0.00	5.35	2108	394	2108	394
	36	5	303	42.31	5.43	6.23	5.43	0.00	0.00	5.67	1645	290	1645	290
	37	6	330	38.46	4.93	6.15	4.93	0.00	0.00	5.98	1628	272	1628	272
C	**38**	**7**	**326**	**34.62**	**4.44**	**6.07**	**4.44**	**0.00**	**0.00**	**6.29**	**1448**	**230**	**1448**	**230**
	39	8	348	30.77	3.95	6.21	3.95	0.00	0.00	6.50	1374	211	1374	211
	40	9	335	26.92	3.45	6.36	3.45	0.00	0.00	6.70	1157	173	1157	173
	41	10	315	23.08	2.96	6.50	2.96	0.00	0.00	6.90	933	135	933	135
	42	11	215	19.23	2.47	6.64	2.47	0.00	0.00	7.10	530	75	530	75
D	**43**	**12**	**169**	**15.38**	**1.97**	**6.78**	**1.97**	**0.00**	**0.00**	**7.30**	**334**	**46**	**334**	**46**
	44	13	151	11.54	1.48	6.93	1.48	0.00	0.00	7.50	224	30	224	30
	45	14	105	7.69	0.99	7.07	0.99	0.00	0.00	7.70	104	13	104	13
	46	15	74	3.85	0.49	7.21	0.49	0.00	0.00	7.90	37	5	37	5
		Σ	4910							Σ	26500	5482	26440	5421

SCOPon	4.83	SCOPnet	4.88
		SCOP	**4.83**

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 14511-3:2023, ČSN EN 14825:2023
Sample tested:	Heat pump **Neoheat Eko Mono 15 (R290)**
Measuring equipment used:	see Chapter III

Design			Air / water – monobloc		
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	**142.7**	%
		Warmer	η_s	–	%
		Colder	η_s	–	%
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**	**3.64**	–
		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	$P_{designh}$	**11.76**	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}	6670	kWh
		Warmer	Q_{HE}	–	kWh
		Colder	Q_{HE}	–	kWh
Modes other than „active mode“		Off mode	P_{OFF}	18.9	W
		Thermostat off mode	P_{TO}	21.9	W
		Standby mode	P_{SB}	18.9	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}	0.0219	[kW]
P_{SB}	0.0189	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0189	[kW]
$P_{designh}$	11.76	[kW]
$SCOP_{ON}$	3.64	[–]

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]

$Q_H = 11.76 \cdot 2066 = 24291$ [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]

$Q_{HE} = 24291 / 3.64 + 178 \cdot 0.0219 + 0 \cdot 0.0189 + 178 \cdot 0 + 0 \cdot 0.0189 = 6670$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 24291 / 6670 = 3.64$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

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

$\eta_s (A) = (1 / 2.5) \cdot 3.64 – 0.03 =$ **<u>1.427</u>** [–]

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/W36.96**
Date of testing		**2024-08-27**	**2024-08-28**	**2024-08-28**
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]	51.90	42.10	36.92
Input heating water – temperature calculation	[°C]	45.23	37.73	33.35
Output heating water temperature	[°C]	51.90	42.10	36.92
Input heating water temperature	[°C]	45.23	37.73	33.35
Air temperature – dry bulb temperature	[°C]	-6.99	2.02	7.01
Air temperature – wet bulb temperature	[°C]	-7.87	1.02	6.02
Relative humidity	[%]	77.91	83.77	87.04
Barometric pressure	[kPa]	99.012	98.993	98.860
Ambient temperature	[°C]	-7.01	2.11	7.14
Secondary circuit pressure difference	[kPa]	14.203	14.193	14.113
Efficiency of the secondary liquid pump	[–]	0.180	0.180	0.180
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.3610	1.3610	1.3610
Density of heating water	[$kg \cdot m^{-3}$]	987.2	991.4	993.3
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.178	4.175	4.175
Voltage	[V]	402.58	400.85	402.39
Total current	[A]	22.52	10.54	6.64
Overall power input	[kW]	4.516	1.944	1.196
Capacity correction of sec. liquid pump	[W]	24.400	24.391	24.312
Power input correction of sec. liquid pump	[W]	29.77	29.76	29.65
Heating capacity – heating water	[kW]	10.425	6.838	5.597
Corrected heating capacity – heating water	**[kW]**	**10.401**	**6.814**	**5.573**
Uncertainty of corrected heating capacity	[kW]	± 0.136	± 0.135	± 0.134
Effective electric power input	**[kW]**	**4.487**	**1.915**	**1.166**
COP	**[–]**	**2.318**	**3.559**	**4.779**
Uncertainty of COP	[–]	± 0.031	± 0.071	± 0.116
Control settings	**[Hz]**	**90**	**45**	**30**
Circulation pump settings – heating water	[–]	Low	Low	Low

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/W32.59**	**A-10/W55**
Date of testing		**2024-09-02**	**2024-09-05**
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]	32.64	54.99
Input heating water – temperature calculation	[°C]	28.90	48.91
Output heating water temperature	[°C]	32.64	54.99
Input heating water temperature	[°C]	28.90	48.91
Air temperature – dry bulb temperature	[°C]	12.00	-10.01
Air temperature – wet bulb temperature	[°C]	11.01	-10.89
Relative humidity	[%]	89.10	73.23
Barometric pressure	[kPa]	98.413	98.435
Ambient temperature	[°C]	12.09	-10.12
Secondary circuit pressure difference	[kPa]	14.137	14.117
Efficiency of the secondary liquid pump	[–]	0.180	0.180
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.3610	1.3610
Density of heating water	[$kg \cdot m^{-3}$]	994.7	985.8
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.179
Voltage	[V]	401.88	401.83
Total current	[A]	6.00	22.00
Overall power input	[kW]	1.042	4.533
Capacity correction of sec. liquid pump	[W]	24.336	24.317
Power input correction of sec. liquid pump	[W]	29.68	29.65
Heating capacity – heating water	[kW]	5.874	9.517
Corrected heating capacity – heating water	**[kW]**	**5.849**	**9.493**
Uncertainty of corrected heating capacity	[kW]	± 0.135	± 0.136
Effective electric power input	**[kW]**	**1.013**	**4.503**
COP	**[–]**	**5.777**	**2.108**
Uncertainty of COP	[–]	± 0.134	± 0.030
Control settings	**[Hz]**	**30**	**90**
Circulation pump settings – heating water	[–]	Low	Low

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	10.40	10.401	2.318	0.900	1.00	2.318	–
B	2	42.00	53.85	6.33	6.814	3.559	0.900	1.00	3.559	–
C	7	36.96	34.62	4.07	5.573	4.779	0.981	0.73	4.746	0.0219
D	12	32.59	15.38	1.81	5.849	5.777	0.978	0.31	5.511	0.0219
TOL (E)	-10	55.00	100.00	11.76	9.493	2.108	0.900	1.00	2.108	–
Tbiv (F)	-7	52.00	88.46	10.40	10.401	2.318	0.900	1.00	2.318	–

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:

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

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

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

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

For fixed flow:

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

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

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

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

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

Measured data:

$t_{\text{outlet, average}}$	30.00	[°C]
Declared capacity	5.849	[kW]
Declared capacity $_{\text{standard rating condition A7/W55}}$	12.476	[kW]
Part load	1.81	[kW]

Calculation of water temperature

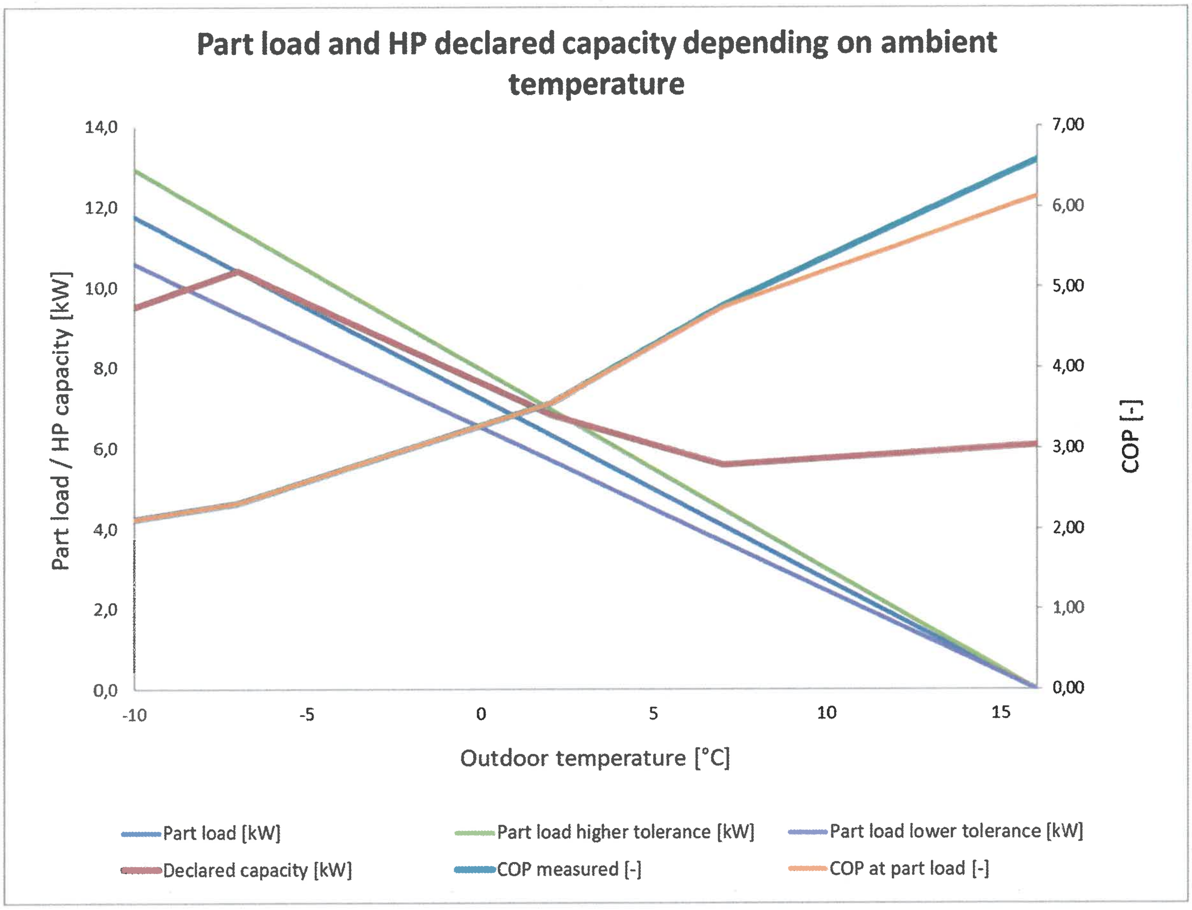
$t_{\text{outlet, capacity test, fixed flow}} = 30 + 8 / 12.476 \cdot (5.849 - 1.81) = \underline{\mathbf{32.69}}$ [°C]

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 × (P h(Tj) - elbu(Tj)) [kWh]	Net annual power input without electric back up heating [kWh]
TOL (E)	**21**	**-10**	**1**	**100.00**	**11.76**	**9.49**	**9.49**	**2.26**	**2.26**	**2.11**	**12**	**7**	**9**	**5**
	22	-9	25	96.15	11.31	9.80	9.80	1.51	37.74	2.18	283	150	245	112
	23	-8	23	92.31	10.85	10.10	10.10	0.75	17.36	2.25	250	121	232	103
A, Tbiv (F)	**24**	**-7**	**24**	**88.46**	**10.40**	**10.40**	**10.40**	**0.00**	**0.00**	**2.32**	**250**	**108**	**250**	**108**
	25	-6	27	84.62	9.95	10.00	9.95	0.00	0.00	2.46	269	109	269	109
	26	-5	68	80.77	9.50	9.60	9.50	0.00	0.00	2.59	646	249	646	249
	27	-4	91	76.92	9.04	9.21	9.04	0.00	0.00	2.73	823	301	823	301
	28	-3	89	73.08	8.59	8.81	8.59	0.00	0.00	2.87	765	266	765	266
	29	-2	165	69.23	8.14	8.41	8.14	0.00	0.00	3.01	1343	447	1343	447
	30	-1	173	65.38	7.69	8.01	7.69	0.00	0.00	3.15	1330	423	1330	423
	31	0	240	61.54	7.24	7.61	7.24	0.00	0.00	3.28	1737	529	1737	529
	32	1	280	57.69	6.78	7.21	6.78	0.00	0.00	3.42	1899	555	1899	555
B	**33**	**2**	**320**	**53.85**	**6.33**	**6.81**	**6.33**	**0.00**	**0.00**	**3.56**	**2026**	**569**	**2026**	**569**
	34	3	357	50.00	5.88	6.57	5.88	0.00	0.00	3.80	2099	553	2099	553
	35	4	356	46.15	5.43	6.32	5.43	0.00	0.00	4.03	1932	479	1932	479
	36	5	303	42.31	4.97	6.07	4.97	0.00	0.00	4.27	1507	353	1507	353
	37	6	330	38.46	4.52	5.82	4.52	0.00	0.00	4.51	1492	331	1492	331
C	**38**	**7**	**326**	**34.62**	**4.07**	**5.57**	**4.07**	**0.00**	**0.00**	**4.75**	**1327**	**280**	**1327**	**280**
	39	8	348	30.77	3.62	5.63	3.62	0.00	0.00	4.90	1259	257	1259	257
	40	9	335	26.92	3.17	5.68	3.17	0.00	0.00	5.05	1060	210	1060	210
	41	10	315	23.08	2.71	5.74	2.71	0.00	0.00	5.20	855	164	855	164
	42	11	215	19.23	2.26	5.79	2.26	0.00	0.00	5.36	486	91	486	91
D	**43**	**12**	**169**	**15.38**	**1.81**	**5.85**	**1.81**	**0.00**	**0.00**	**5.51**	**306**	**55**	**306**	**55**
	44	13	151	11.54	1.36	5.90	1.36	0.00	0.00	5.66	205	36	205	36
	45	14	105	7.69	0.90	5.96	0.90	0.00	0.00	5.82	95	16	95	16
	46	15	74	3.85	0.45	6.01	0.45	0.00	0.00	5.97	33	6	33	6
		Σ	4910							Σ	24287	6665	24229	6607

SCOPon	3.64	SCOPnet	3.67
		SCOP	**3.64**

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

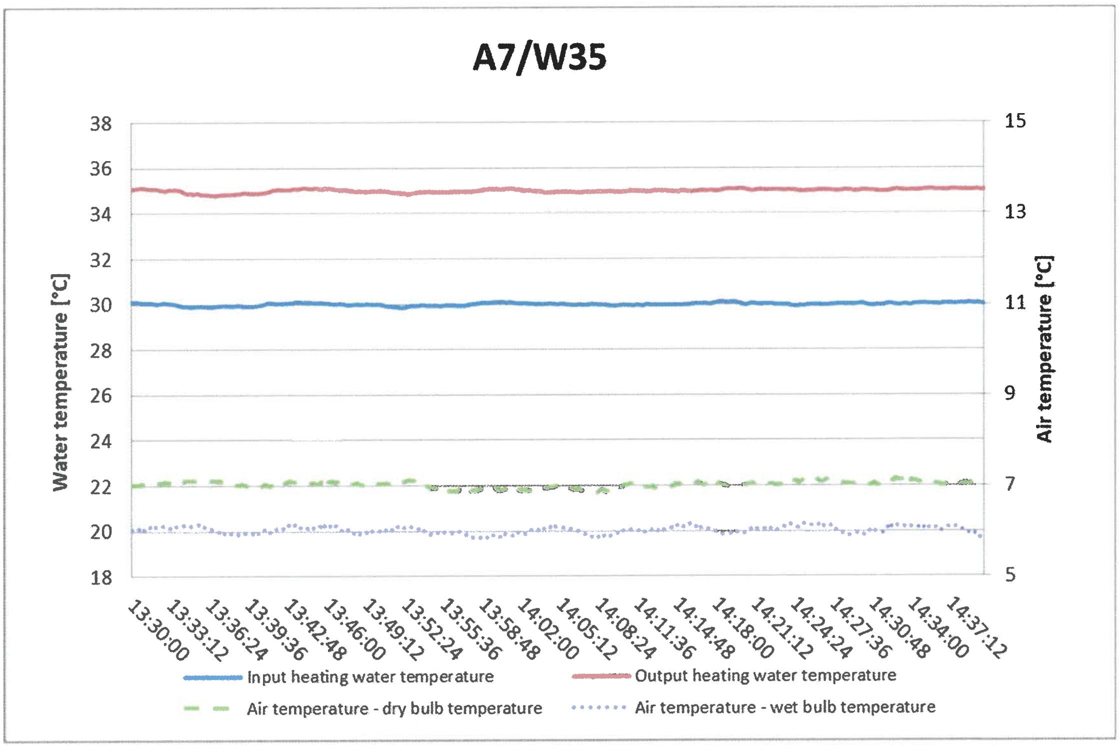


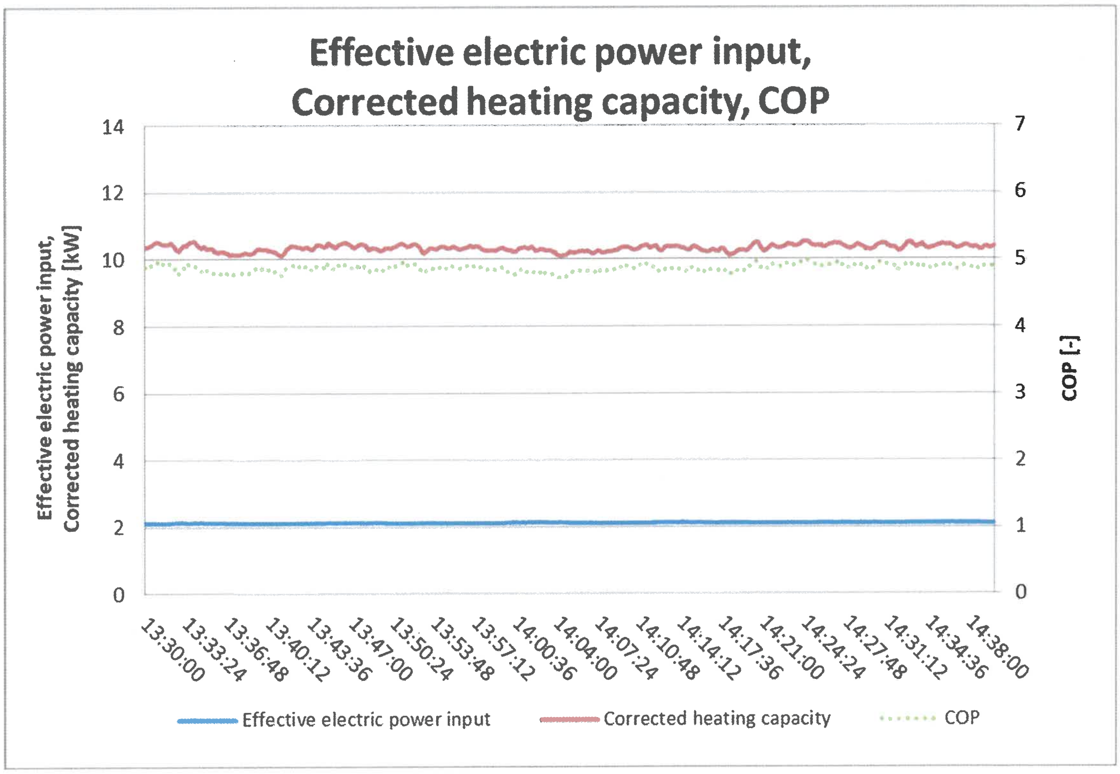
Tested by:	Ing. Tomáš Sedláček	Date:	2024-10-16	Signed:	Sedláček
Reviewed and approved by:	Ing. Michal Faltýnek	Date:	2024-10-16	Signed:	Faltýnek

V. Graphs

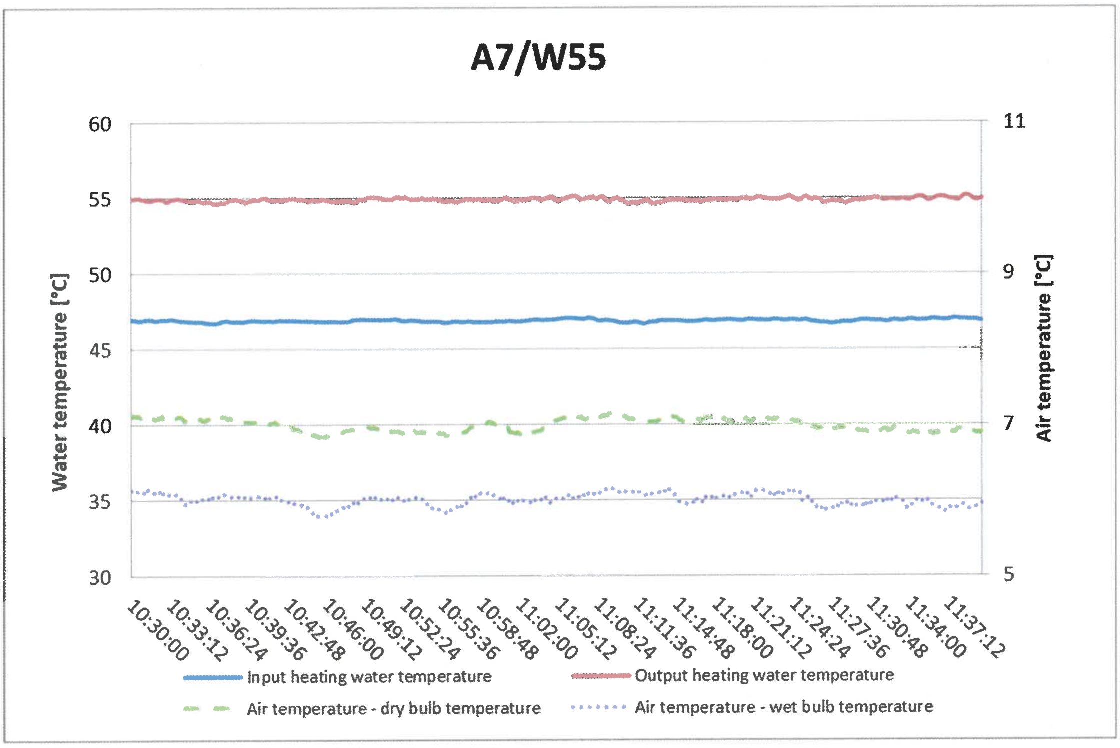
1. Rating conditions

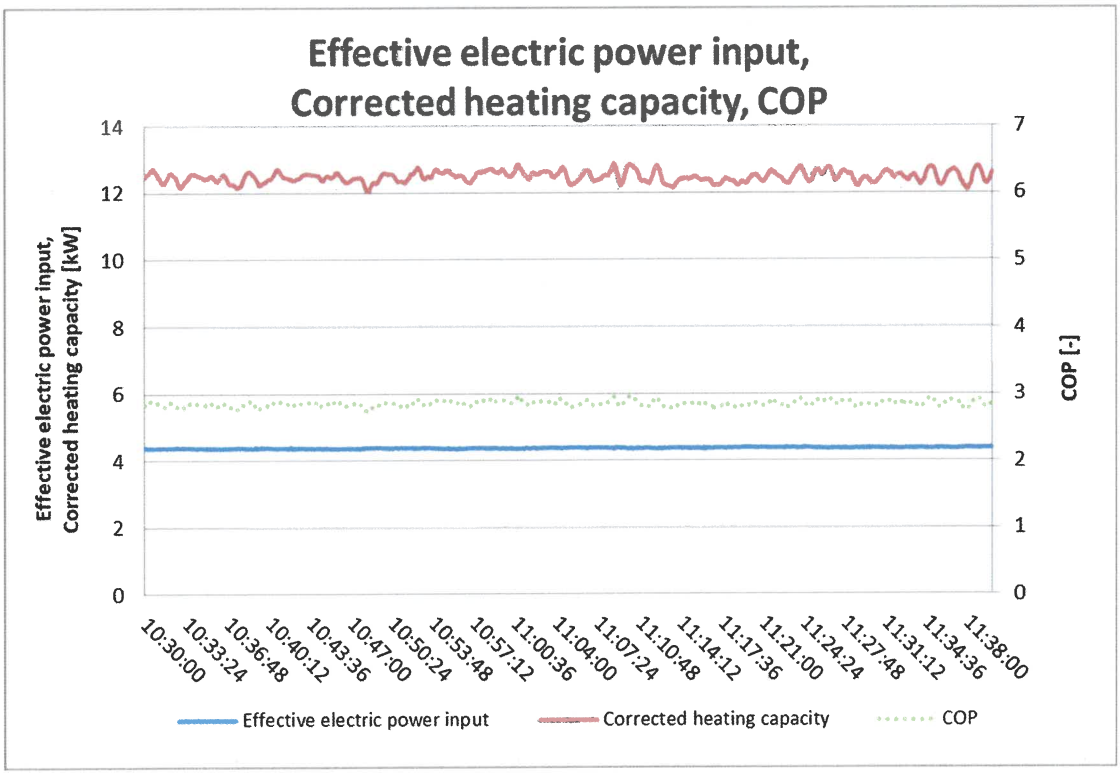
A7/W35 (55 Hz)





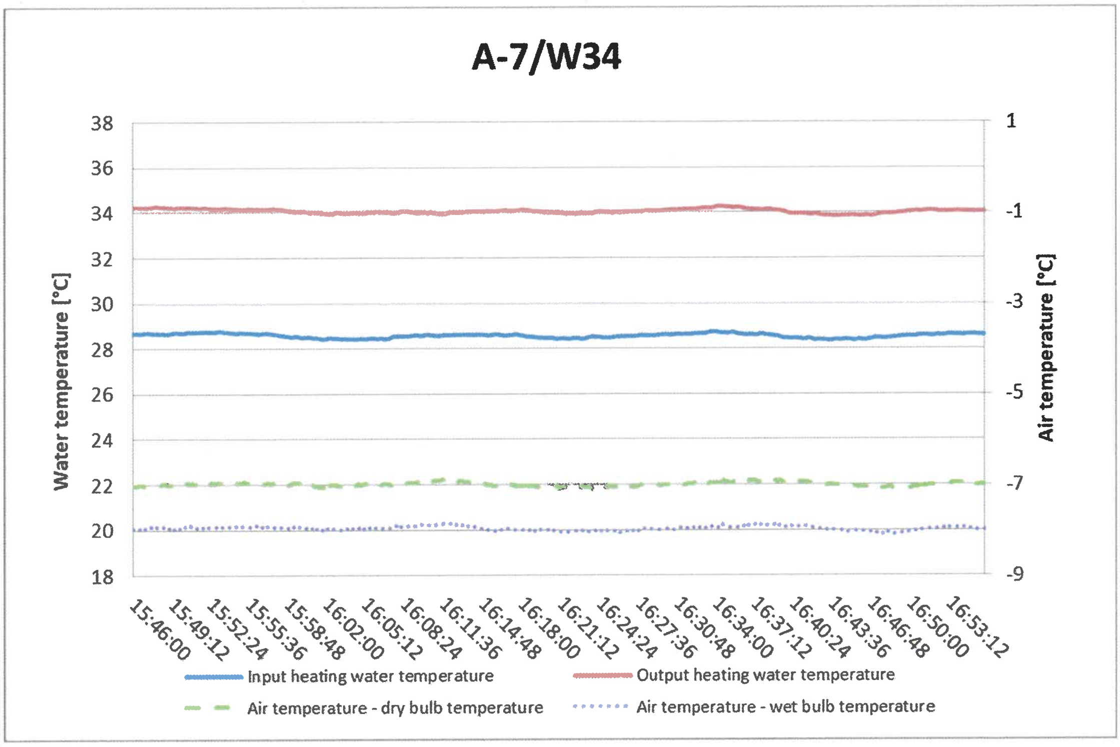
A7/W55 (77 Hz)

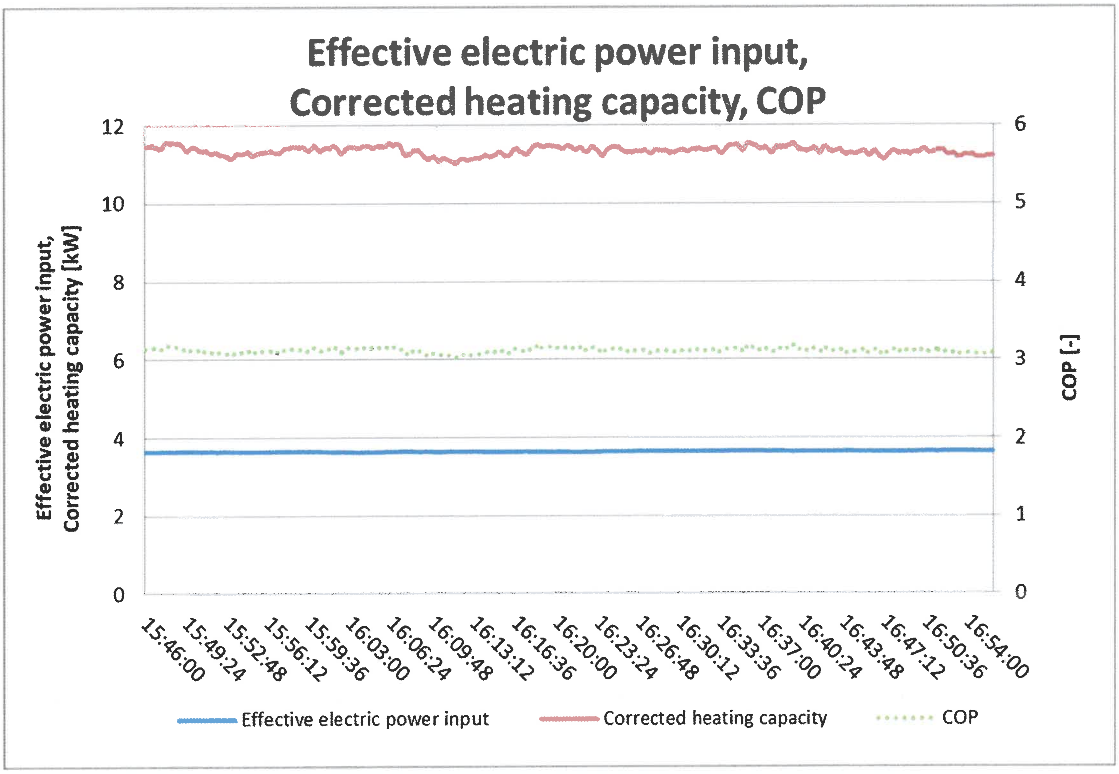

A7/W55
Water temperature [°C]
Air temperature [°C]
60
55
50
45
40
35
30
11
9
7
5
10:30:00 10:33:12 10:36:24 10:39:36 10:42:48 10:46:00 10:49:12 10:52:24 10:55:36 10:58:48 11:02:00 11:05:12 11:08:24 11:11:36 11:14:48 11:18:00 11:21:12 11:24:24 11:27:36 11:30:48 11:34:00 11:37:12
Input heating water temperature
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 [-]
14
12
10
8
6
4
2
0
7
6
5
4
3
2
1
0
10:30:00 10:33:24 10:36:48 10:40:12 10:43:36 10:47:00 10:50:24 10:53:48 10:57:12 11:00:36 11:04:00 11:07:24 11:10:48 11:14:12 11:17:36 11:21:00 11:24:24 11:27:48 11:31:12 11:34:36 11:38:00
Effective electric power input
Corrected heating capacity
COP

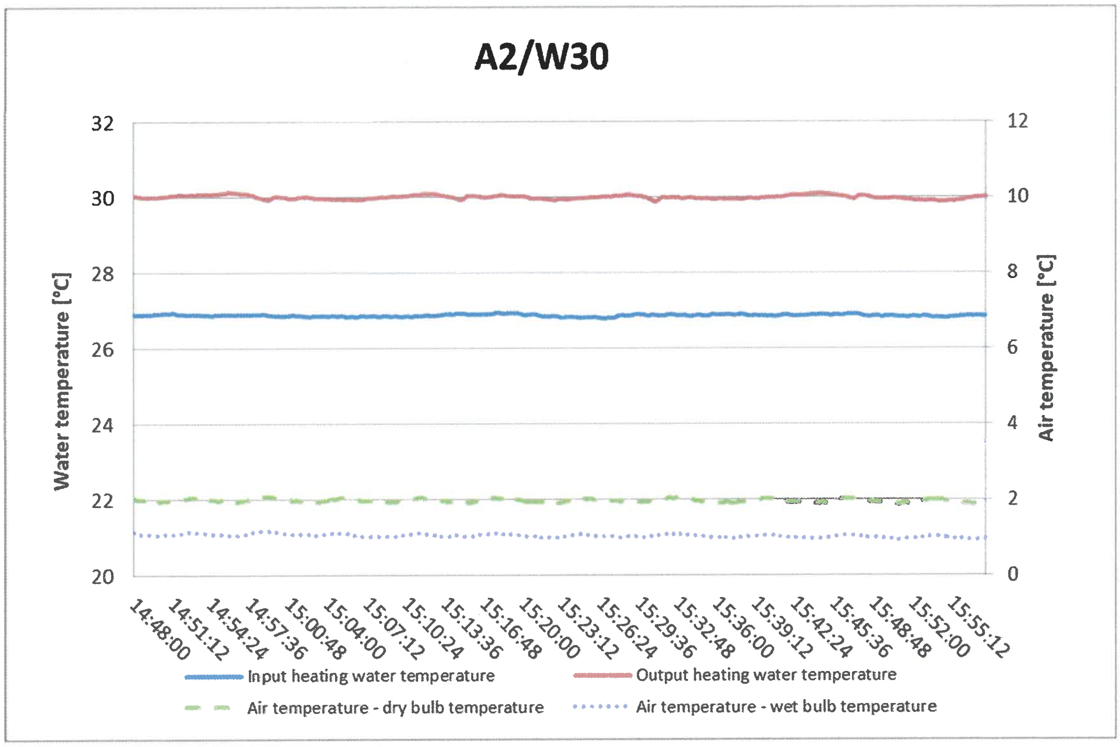
2. Seasonal performance tests and SCOP calculation – Low temperature application

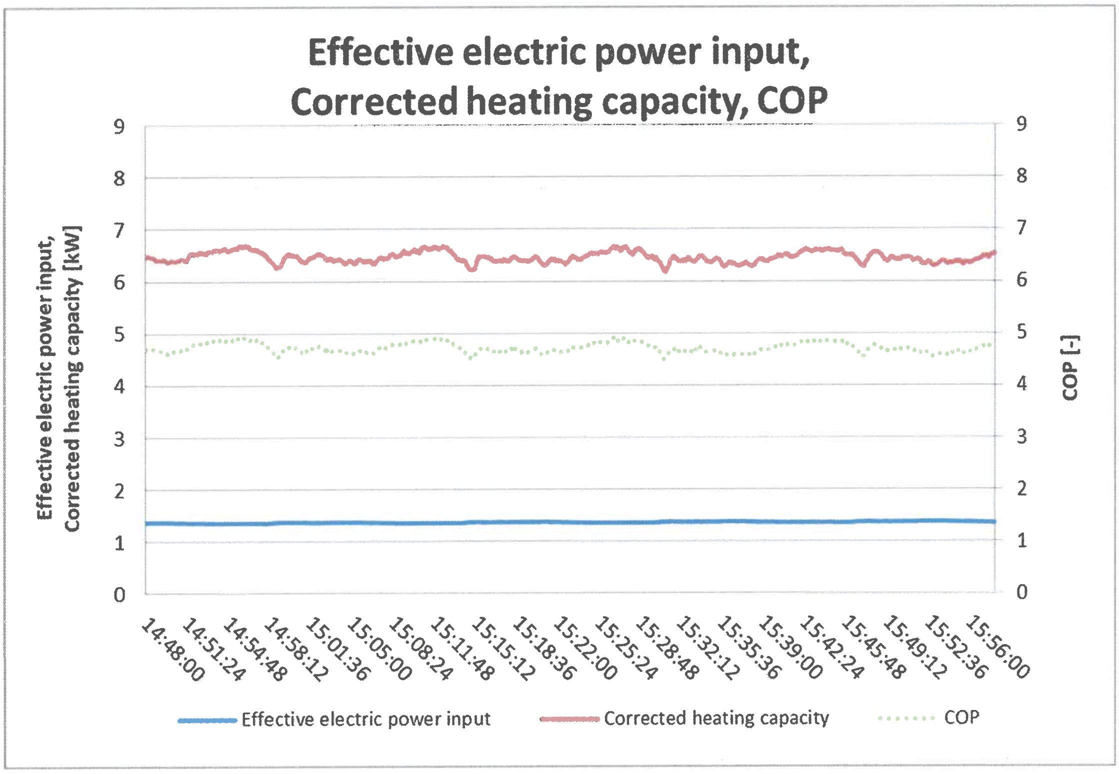
A-7/W34 (90 Hz)



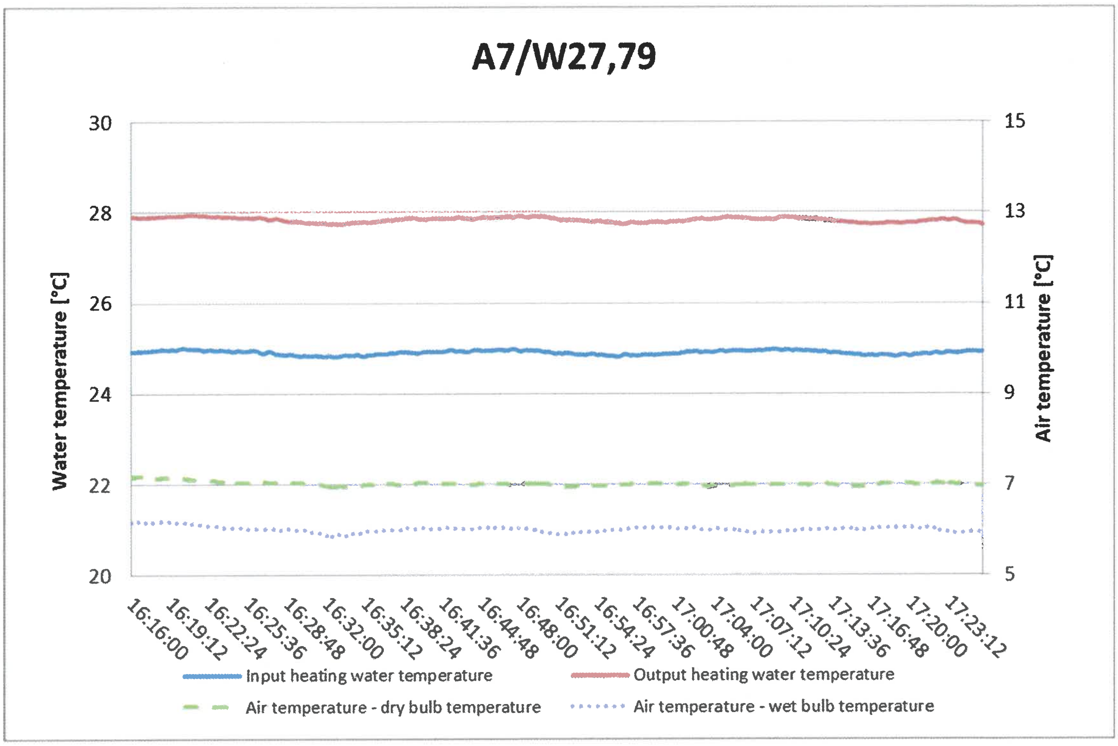


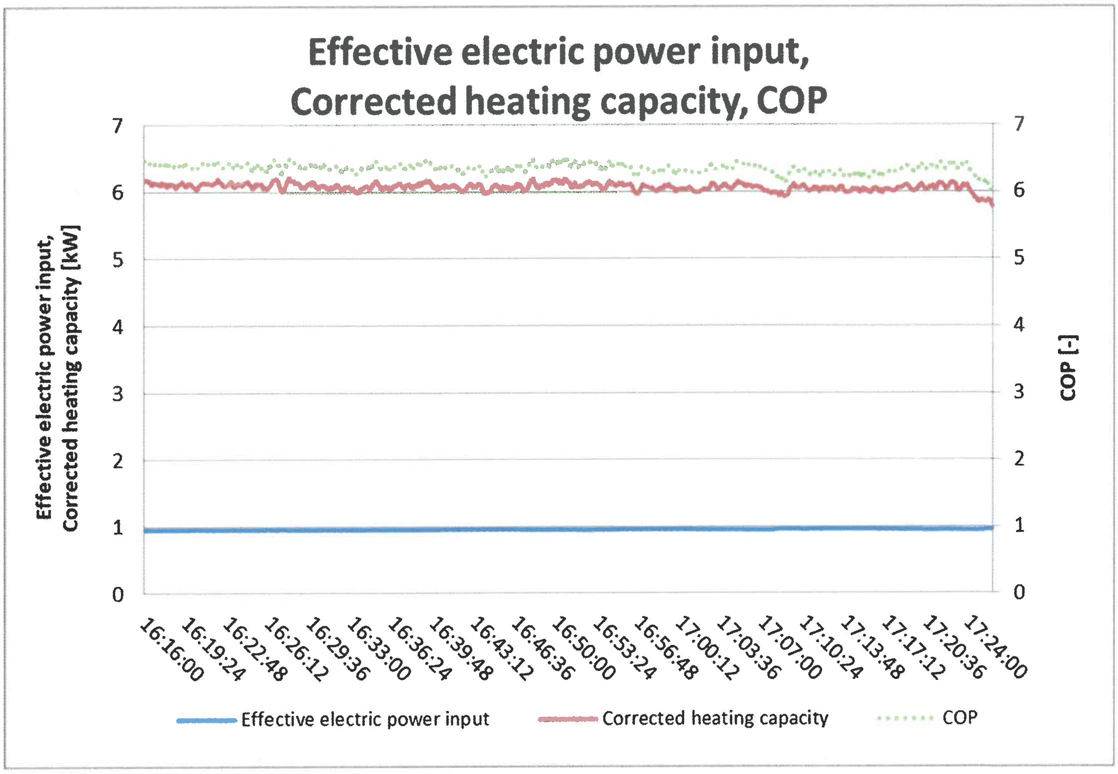
A2/W30 (40 Hz)


A2/W30
Water temperature [°C]
Air temperature [°C]
32
30
28
26
24
22
20
12
10
8
6
4
2
0
14:48:00
14:51:12
14:54:24
14:57:36
15:00:48
15:04:00
15:07:12
15:10:24
15:13:36
15:16:48
15:20:00
15:23:12
15:26:24
15:29:36
15:32:48
15:36:00
15:39:12
15:42:24
15:45:36
15:48:48
15:52:00
15:55:12
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

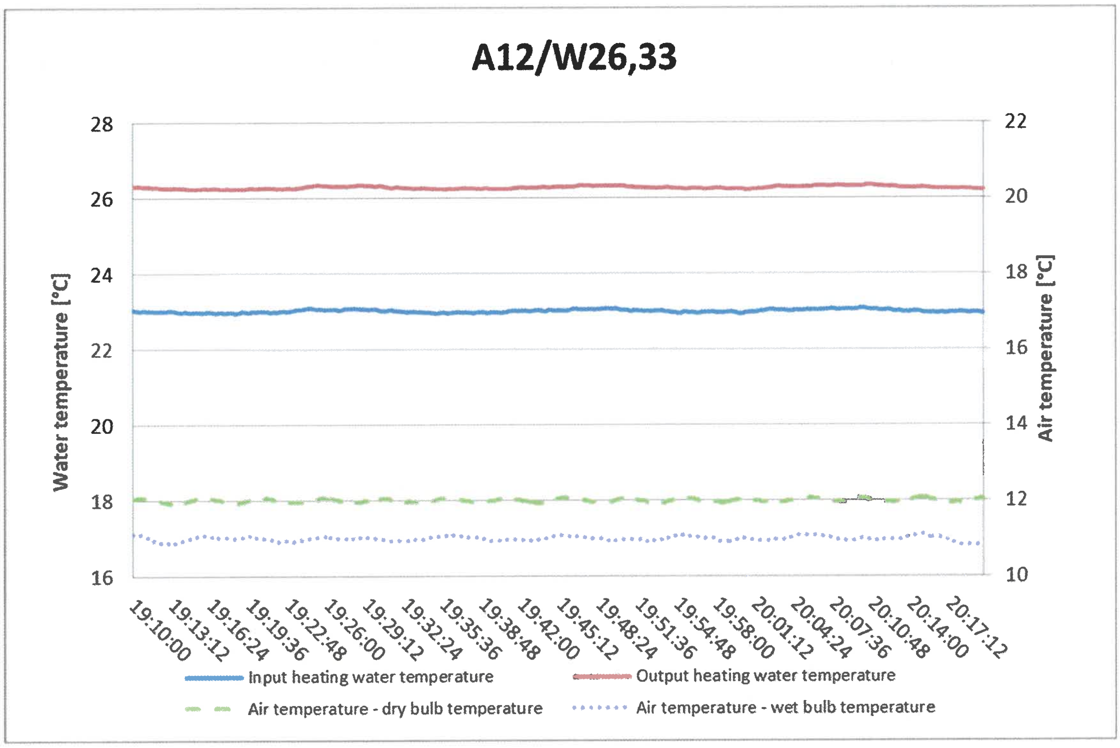

Effective electric power input, Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
9
8
7
6
5
4
3
2
1
0
14:48:00
14:51:24
14:54:48
14:58:12
15:01:36
15:05:00
15:08:24
15:11:48
15:15:12
15:18:36
15:22:00
15:25:24
15:28:48
15:32:12
15:35:36
15:39:00
15:42:24
15:45:48
15:49:12
15:52:36
15:56:00
Effective electric power input
Corrected heating capacity
COP

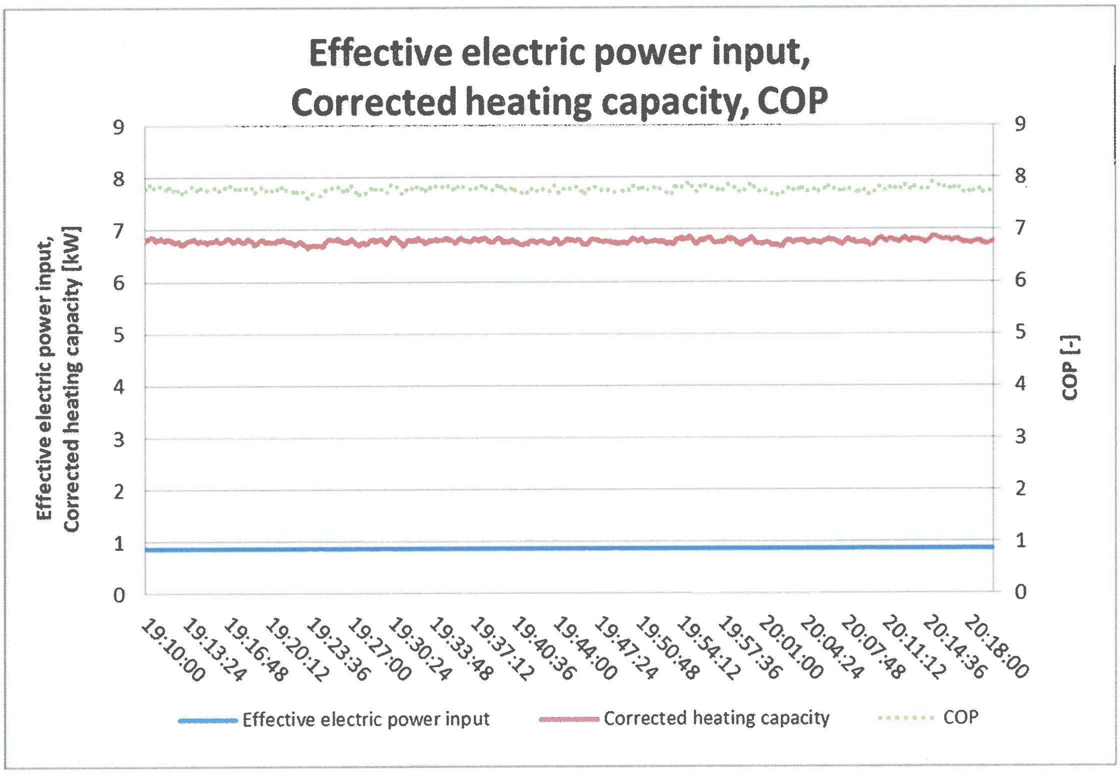
A7/W27.79 (30 Hz)



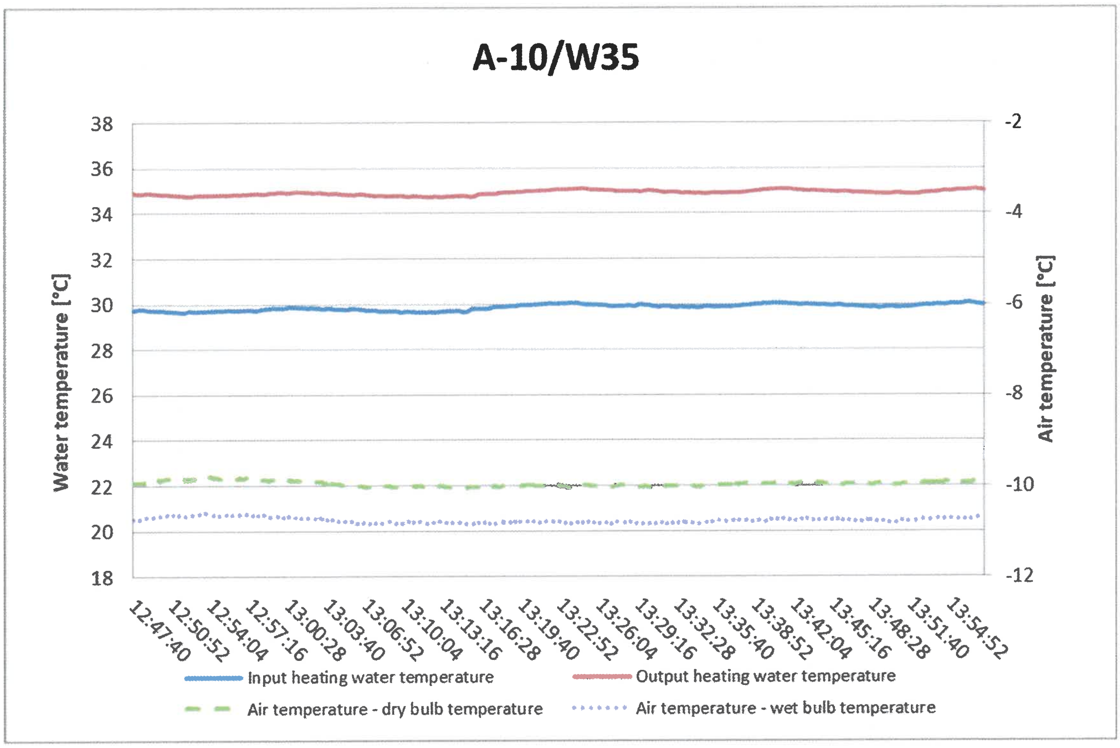


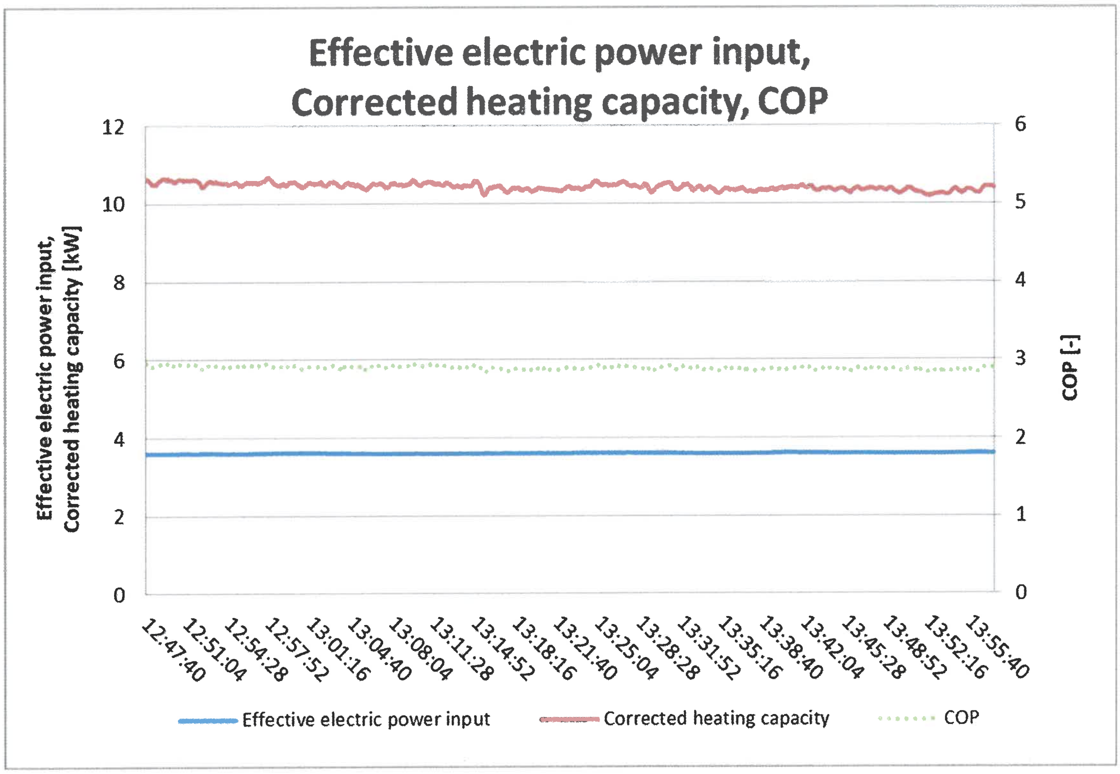
A12/W26.33 (30 Hz)





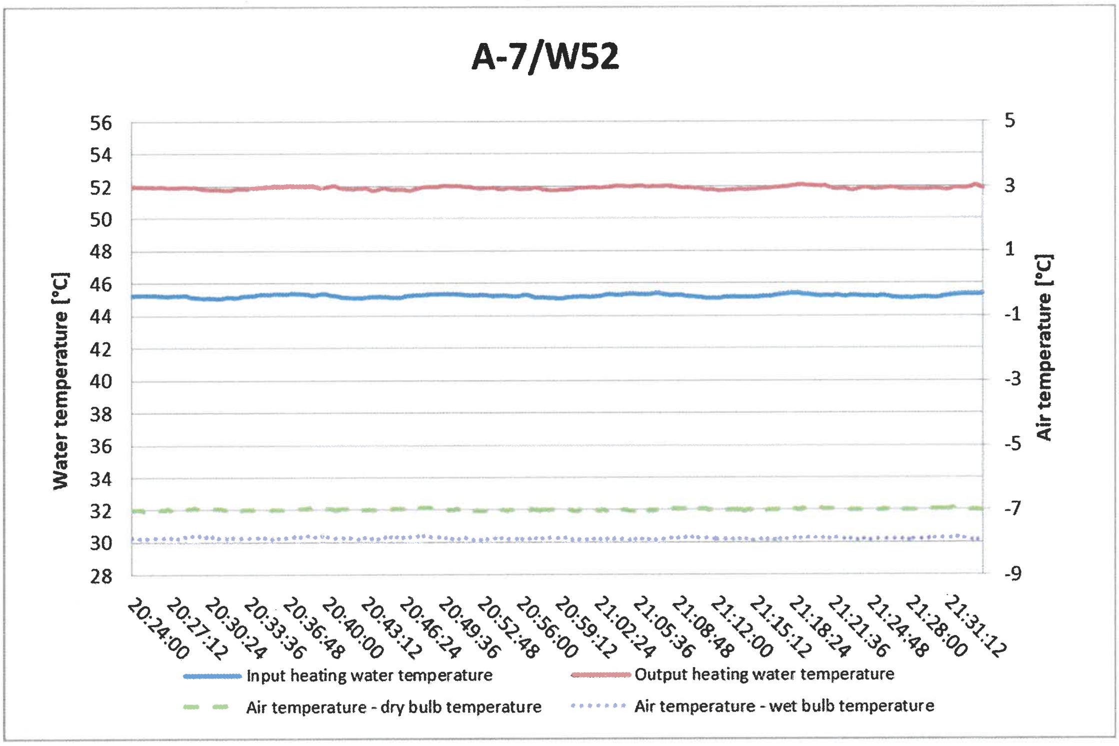
A-10/W35 (90 Hz)

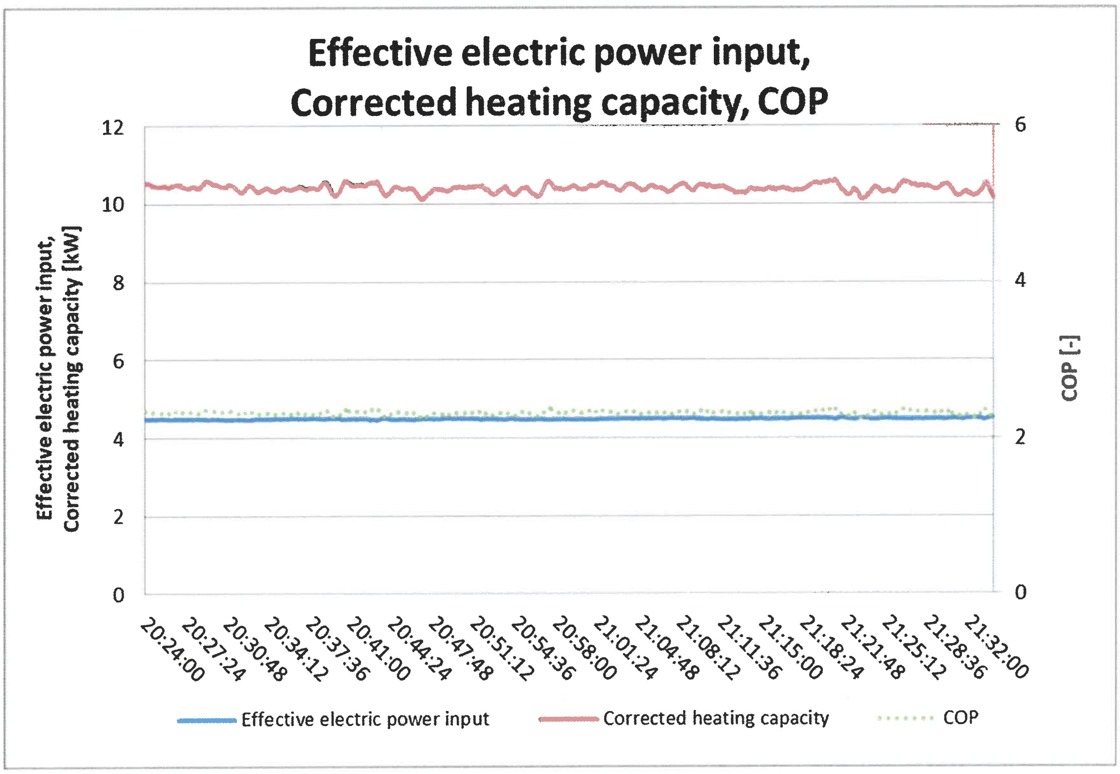

A-10/W35
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
26
24
22
20
18
-2
-4
-6
-8
-10
-12
12:47:40
12:50:52
12:54:04
12:57:16
13:00:28
13:03:40
13:06:52
13:10:04
13:13:16
13:16:28
13:19:40
13:22:52
13:26:04
13:29:16
13:32:28
13:35:40
13:38:52
13:42:04
13:45:16
13:48:28
13:51:40
13:54:52
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
6
5
4
3
2
1
0
12:47:40
12:51:04
12:54:28
12:57:52
13:01:16
13:04:40
13:08:04
13:11:28
13:14:52
13:18:16
13:21:40
13:25:04
13:28:28
13:31:52
13:35:16
13:38:40
13:42:04
13:45:28
13:48:52
13:52:16
13:55:40
Effective electric power input
Corrected heating capacity
COP

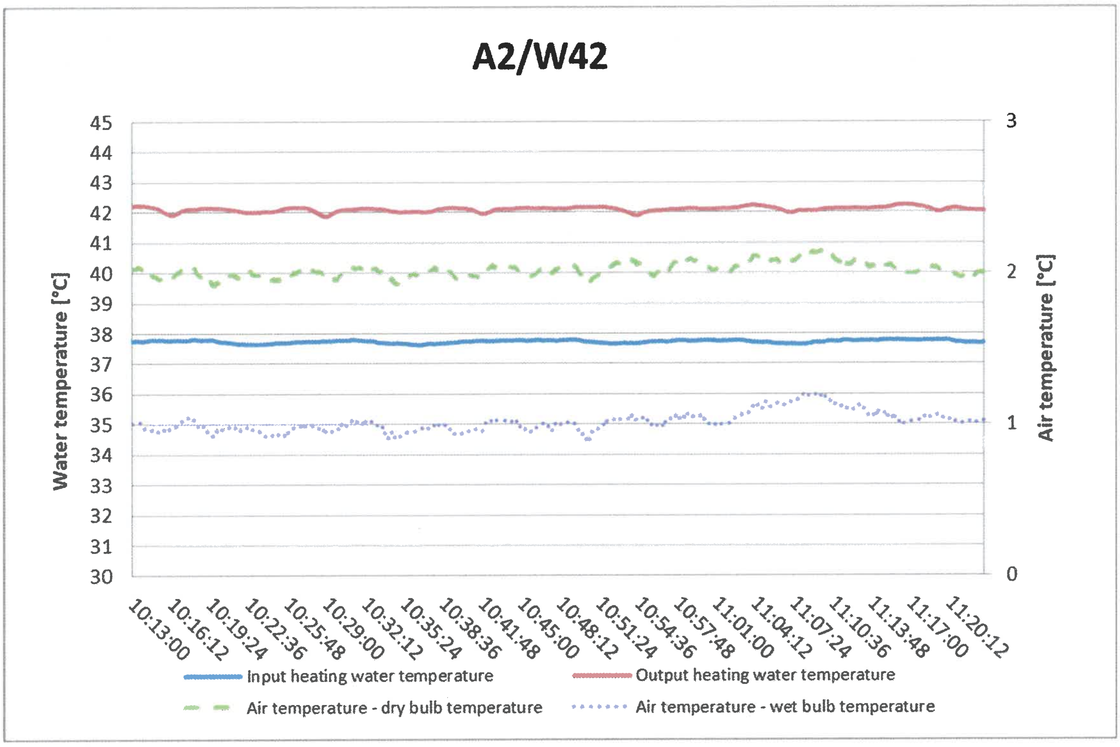
3. Seasonal performance tests and SCOP calculation – Medium temperature application

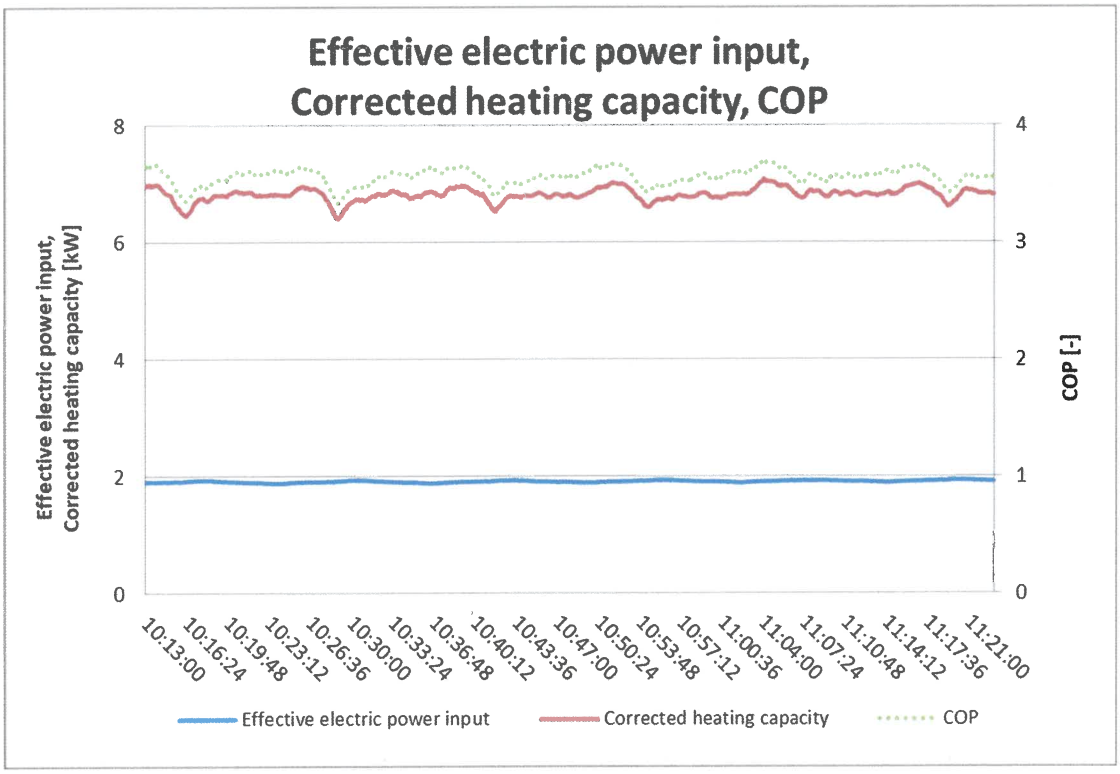
A-7/W52 (90 Hz)



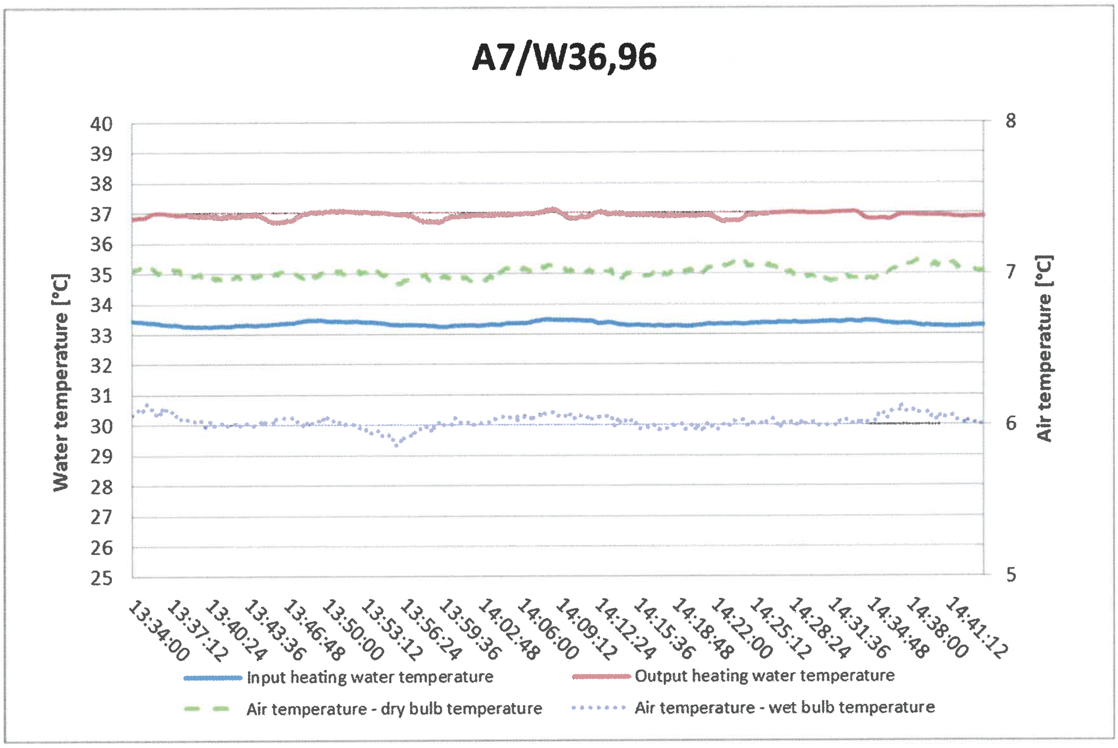


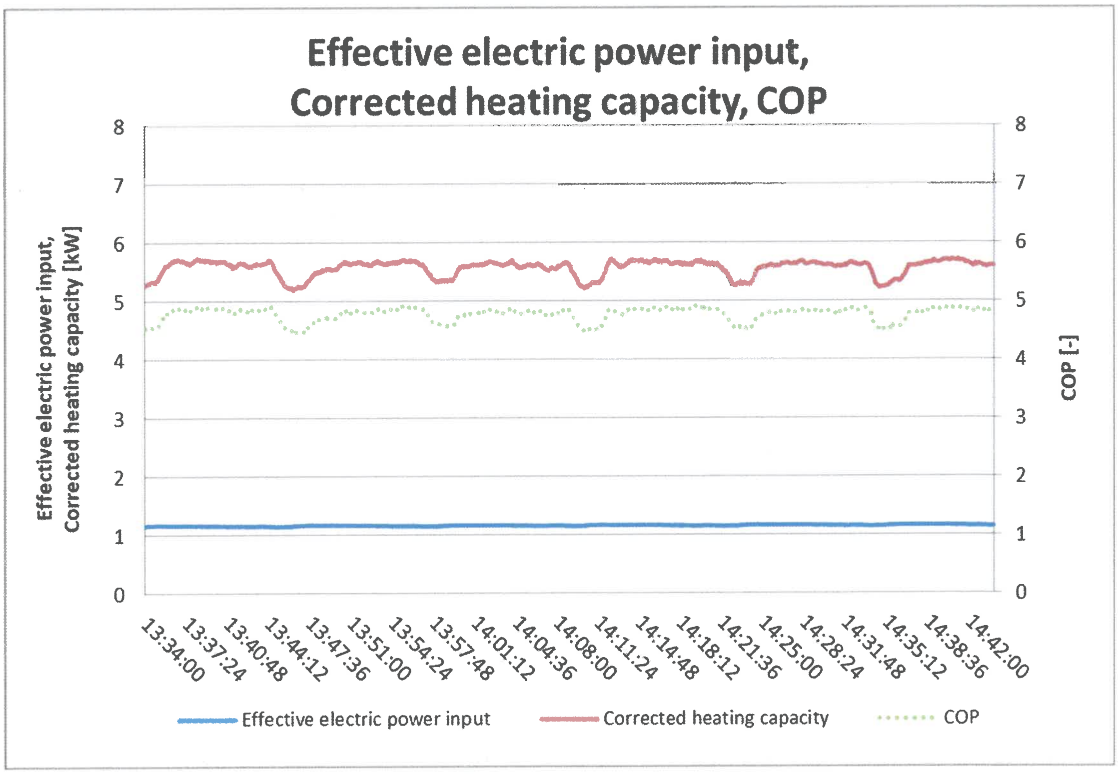
A2/W42 (45 Hz)


A2/W42
Water temperature [°C]
Air temperature [°C]
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
3
2
1
0
10:13:00
10:16:12
10:19:24
10:22:36
10:25:48
10:29:00
10:32:12
10:35:24
10:38:36
10:41:48
10:45:00
10:48:12
10:51:24
10:54:36
10:57:48
11:01:00
11:04:12
11:07:24
11:10:36
11:13:48
11:17:00
11:20:12
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

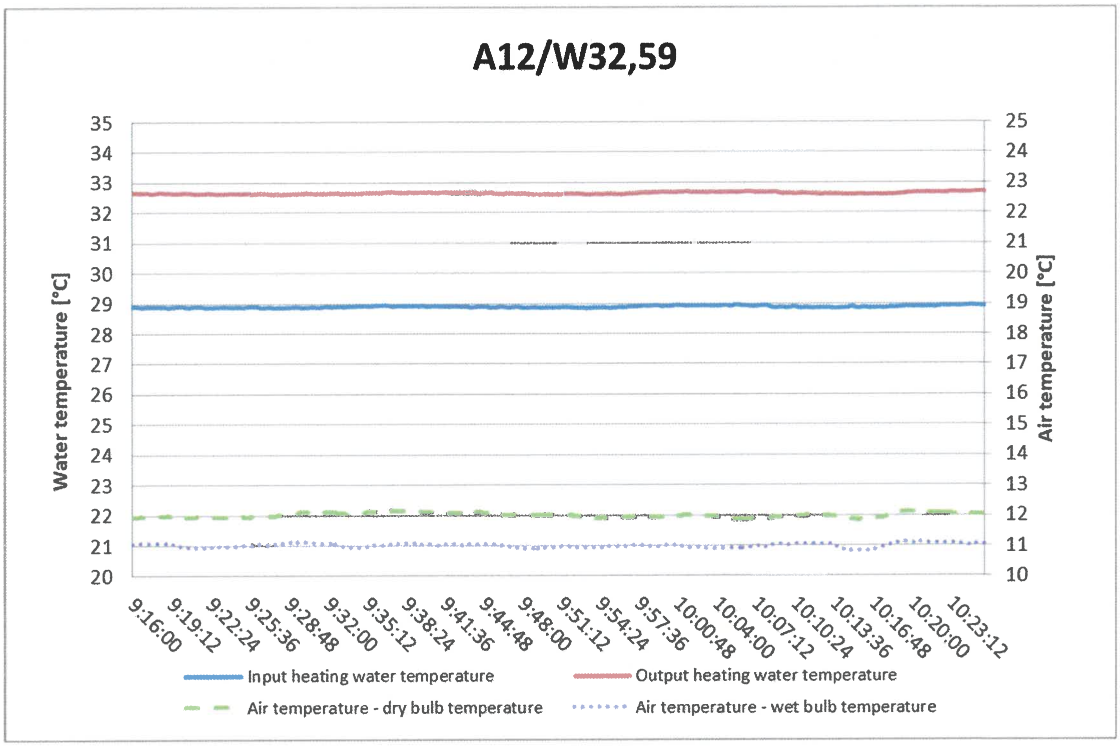

Effective electric power input, Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
8
6
4
2
0
4
3
2
1
0
10:13:00
10:16:24
10:19:48
10:23:12
10:26:36
10:30:00
10:33:24
10:36:48
10:40:12
10:43:36
10:47:00
10:50:24
10:53:48
10:57:12
11:00:36
11:04:00
11:07:24
11:10:48
11:14:12
11:17:36
11:21:00
Effective electric power input
Corrected heating capacity
COP

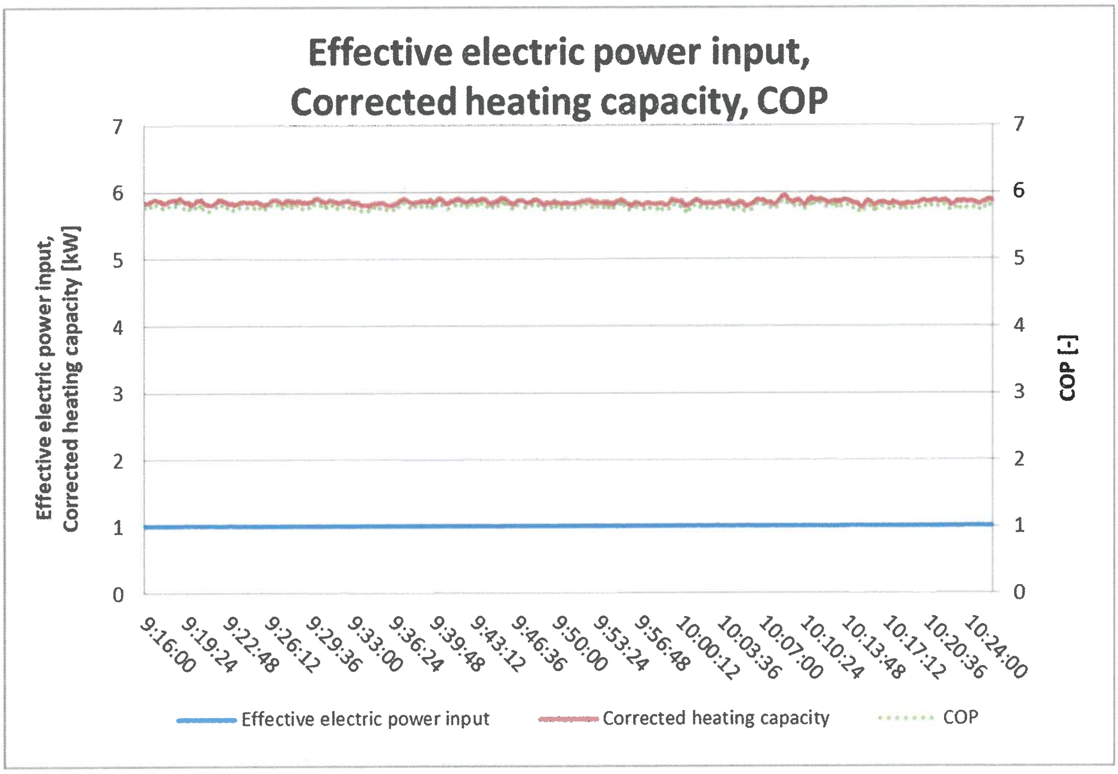
A7/W36.96 (30 Hz)



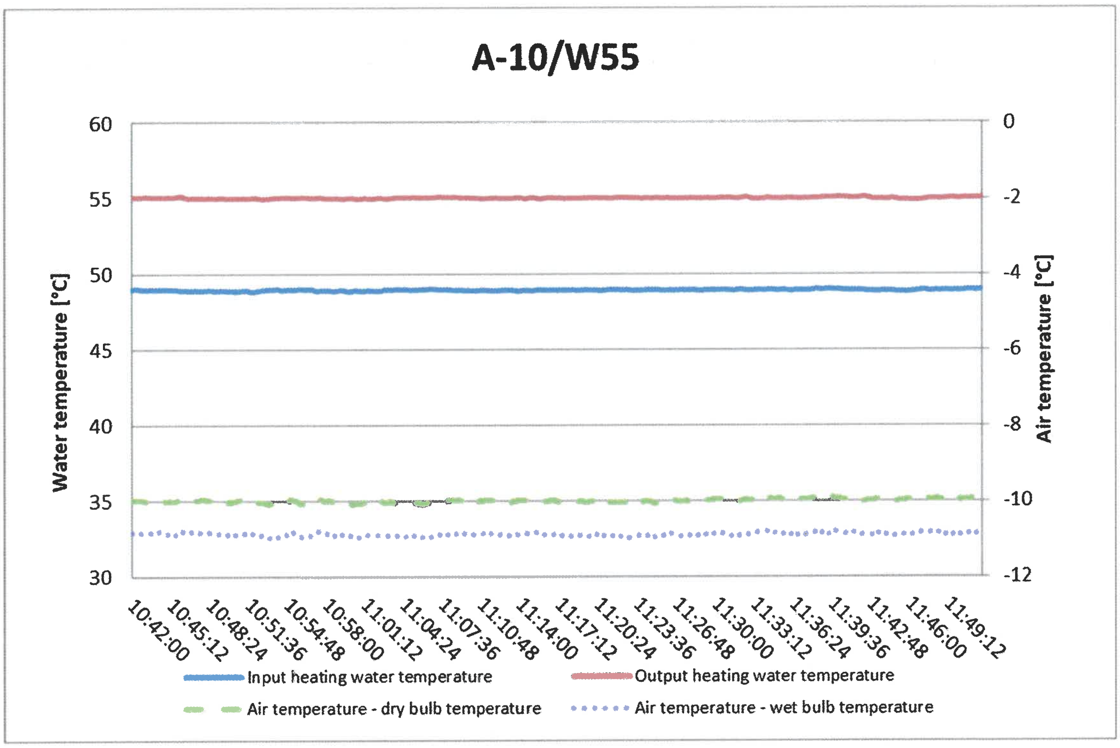


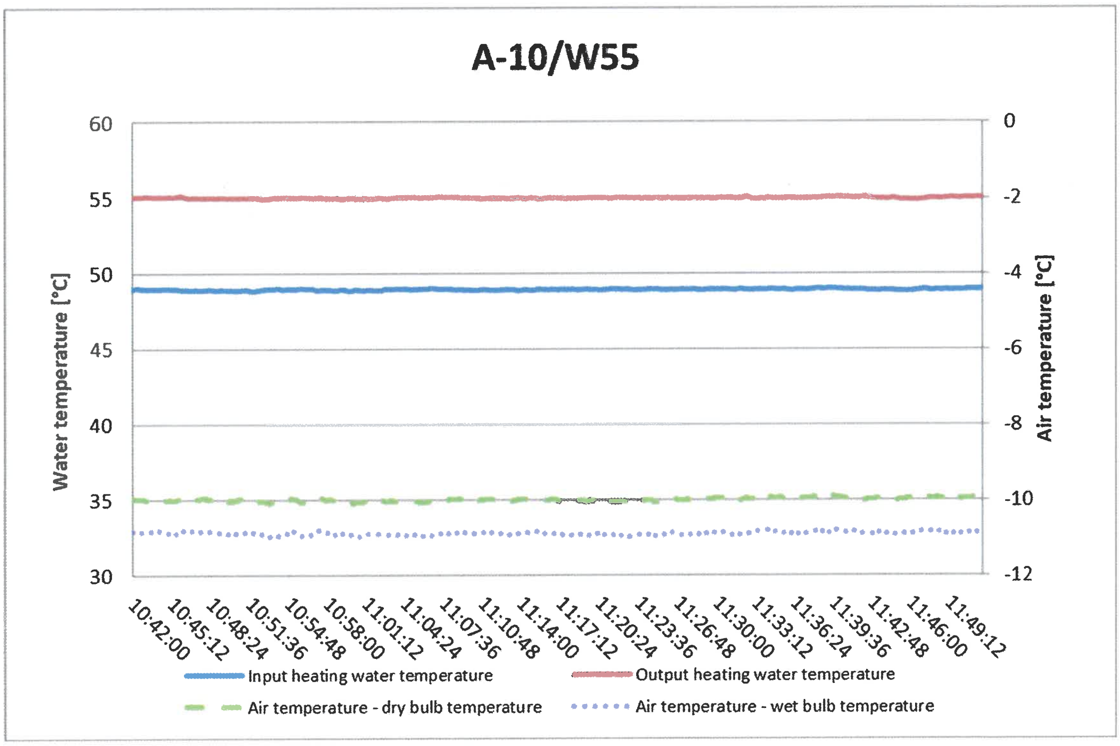
A12/W32.59 (30 Hz)





A-10/W55 (90 Hz)


A-10/W55
60
55
50
45
40
35
30
Water temperature [°C]
0
-2
-4
-6
-8
-10
-12
Air temperature [°C]
10:42:00
10:45:12
10:48:24
10:51:36
10:54:48
10:58:00
11:01:12
11:04:24
11:07:36
11:10:48
11:14:00
11:17:12
11:20:24
11:23:36
11:26:48
11:30:00
11:33:12
11:36:24
11:39:36
11:42:48
11:46:00
11:49:12
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature


A-10/W55
60
55
50
45
40
35
30
Water temperature [°C]
0
-2
-4
-6
-8
-10
-12
Air temperature [°C]
10:42:00
10:45:12
10:48:24
10:51:36
10:54:48
10:58:00
11:01:12
11:04:24
11:07:36
11:10:48
11:14:00
11:17:12
11:20:24
11:23:36
11:26:48
11:30:00
11:33:12
11:36:24
11:39:36
11:42:48
11:46:00
11:49:12
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

VI. A list of referenced documents

- Order B-82538 of 2024-06-27 (Order reg. no. B-82538, received on 2024-06-27)
- Contract B-82538
- 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 14511-3:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling a 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 - Testing and rating at part load conditions and calculation of

Test Report compiled by: Ing. Tomáš Sedláček

Accredited Testing Laboratory No. 1045.1 * STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. * 1

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

– End of Test Report –