Strojírenský zkušební ústav, s.p., Brno, Česká republika
Engineering Test Institute, Public Enterprise, Brno, Czech Republic

TEST CERTIFICATE

Number **O-B-00338-24**

Customer	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLAND
Product	Air/water heat pump – monobloc
Type designation / Trade mark	**DEHER AIRTERM 22 ECO**
Test methods	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023
Basis of certificate	Test reports: 39-17457/T of 2024-02-20 Technical documents of Deher Spółka z ograniczoną odpowiedzialnością
Temperature application	**LOW TEMPERATURE,** (Reference water temperature 35 °C) **MEDIUM TEMPERATURE** (Reference water temperature 55 °C)

Results:

Temperature conditions*	**A7W35**	**A7W55**
Corrected heating capacity [kW]	11.239	11.792
Effective electric power input [kW]	2.368	3.812
Coefficient of performance [–]	4.747	3.094
Compressor settings [Hz]	45	52

(*) Comment to abbreviated marking: e.g. A7/W35

A (air), 7 (input air – dry bulb temperature in °C) / W (water), 35 (output heating (cooling) water temperature in °C).

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

Specification of conditions:

Compressor speed control	**Variable**	Heating water volume flow rate (indoor heat exchanger)	**Fixed**
Outlet water temperature (indoor heat exchanger)	**Variable**	Source liquid volume flow rate (outdoor heat exchanger)	**Variable**
Function	**Reversible**		

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 Testing Laboratory 1045.1.

Brno, 2024-02-20

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. CZ 1

Ing. Mario Jankola
Heating Equipment and Construction Products Manager

– END OF TEST CERTIFICATE –

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

TŁUMACZ PRZYSIĘGŁY
j. angielskiego i j. niemieckiego
mgr JERZY DOMŻOŁ
ul. Fojkisa 8a/1, 41-103 Siemianowice Śl
tel/fax 032 2285773 kom.0604 504 119

UWIERZYTELNIONE TŁUMACZENIE
Z JĘZYKA ANGIELSKIEGO

Strojirenský zkušebni ústav, s.p., Brno Česká republika
Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe, Brno, Republika Czeska

CERTYFIKAT Z BADAŃ
numer O-B-00338-24

Klient:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn Polska
Produkt:	Pompa ciepła powietrze/woda - monoblok
Rodzaj oznaczenia/znak towarowy:	DEHER AIRTERM 22 ECO
Metody badań:	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023
Podstawa certyfikatu:	Raporty z badań: 39-17457/T z 2024-02-20 Dokumenty techniczne Deher Spółka z ograniczoną odpowiedzialnością
Zakres temperatur	**NISKA TEMPERATURA** **(Temperatura referencyjna wody 35° C)** **ŚREDNIA TEMPERATURA** (Temperatura referencyjna wody 55° C)

Wyniki:

Warunki temperaturowe*	**A7W35**	**A7W55**
Skorygowana wydajność grzewcza [kW]	11.239	11.792
Efektywny pobór mocy [kW]	2.368	3.812
Współczynnik wydajości [-]	4.747	3.094
Ustawienia sprężarki [Hz]	45	52

(*) Komentarz do skróconego oznaczenia: np. A7/W35
A (powietrze), 7 (powietrze wejściowe - temperatura suchego termometru w °C) W (woda), 35 (temperatura wyjściowa wody grzewczej (chłodzącej) w °C)

Okrągła pieczęć w języku czeskim: Strojirenský zkušebni ústav, s.p., CZ 1

Specyfikacja wymagań:

Kontrola prędkości kompresora **zmienna**

Natężenie przepływu wody grzewczej: **stałe** (wewnętrzny wymiennik ciepła)

Temperatura wylotu wody **zmienna** (wewnętrzny wymiennik ciepła)

Natężenie przepływu objętości cieczy źródłowej (zewnętrzny wymiennik ciepła) **zmienne**

Funkcja **odwracalna**

Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe potwierdza niniejszym Certyfikatem z badań, że przedmiotowy wyrób został przebadany i uzyskał wyniki wskazane powyżej. Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe jest akredytowanym laboratorium badawczym nr 1045.1.

Brno, 20 lutego 2024

Okrągła pieczęć w języku czeskim: Strojirenský zkušebni ústav, s.p., CZ 1

podpis nieczytelny
inż. Mario Jankola
Dyrektor ds urządzeń grzewczych i wyrobów budowlanych

- KONIEC CERTYFIKATU Z BADAŃ-

Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska

WWW.SZUTEST.CZ

Repertorium Nr 102/2024
Potwierdzam zgodność niniejszego tłumaczenia z okazanym mi pierwopisem - ~~odpisem~~
w języku angielskim

JERZY DOMEŃ TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/345/05

Opłatę pobrano zgodnie z rozporządzeniem Ministra Sprawiedliwości z dnia 8 października 2019 (Dz. U. Nr 201 z 2019, poz. 1975) zmieniającego rozporządzenie Ministra Sprawiedliwości z dnia 24 stycznia 2005 r. w sprawie wynagrodzenia za czynności tłumacza przysięgłego (Dz. U. Nr 15 z 2005 r. poz. 131, Dz. U. Nr 41 z 2007 r. poz. 265 oraz Dz. U. Nr 221 z 2009 r. poz. 1746)

Siemianowice Śląskie, 26 lipca 2024

Strojírenský zkušební ústav, s.p., Brno, Česká republika
Engineering Test Institute, Public Enterprise, Brno, Czech Republic

TEST CERTIFICATE

Number **O-B-00317-24**

Customer	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLAND
Product	Air/water heat pump – monobloc
Type designation / Trademark	**DEHER AIRTERM 22 ECO**
Test methods	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, ČSN EN 14825:2023
Basis of certificate	Test reports: 39-17457/T *of* 2024-02-20 Technical documents of Deher Spółka z ograniczoną odpowiedzialnością
Reference heating season	**„A“ = average** (Reference design temperature $T_{designh}$ = -10 °C)

Results:

LOW TEMPERATURE (Reference water temperature 35 °C)			MEDIUM TEMPERATURE (Reference water temperature 55 °C)		
13.22	**$P_{designh}$ [kW]** … Full load heating				**13.40**
4.46	**SCOP [–]** … Seasonal coefficient of performance				**3.36**
Outdoor temperature **T_j [°C]**	Heating declared capacity **P_{dh} [kW]**	Coefficient of performance at the declared capacity **COP_d [–]**	Outdoor temperature **T_j [°C]**	Heating declared capacity **P_{dh} [kW]**	Coefficient of performance at the declared capacity **COP_d [–]**
T_j = -7	10.683	2.936	T_j = -7	10.720	1.878
T_j = +2	6.688	4.229	T_j = +2	6.576	3.340
T_j = +7	7.692	5.867	T_j = +7	7.325	4.593
T_j = +12	8.628	7.329	T_j = +12	8.495	5.194
T_j = TOL = -10	13.221	2.500	T_j = TOL = -10	13.402	1.879
T_j = $T_{bivalent}$ = -10	13.221	2.500	T_j = $T_{bivalent}$ = -10	13.402	1.879

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

LOW TEMPERATURE (Reference water temperature 35 °C)				MEDIUM TEMPERATURE (Reference water temperature 55 °C)
Power consumption in modes other than „active mode“:				
12.8	Off mode	P_{OFF}	[W]	12.8
12.8	Thermostat off mode	P_{TO}	[W]	12.8
12.8	Standby mode	P_{SB}	[W]	12.8
0	Crankcase heater mode	P_{CK}	[W]	0
Annual electricity consumption for heating according to:				
6131	ČSN EN 14825:2023	Q_{HE}	[kWh]	8241
Seasonal Space heating energy efficiency				
175.2	ČSN EN 14825:2023	η_s	[%]	131.4
Liquid flow rate in outdoor heating exchanger:				
-	Source liquid	Min/Max	[m^3/h]	-
Liquid flow rate in indoor heating exchanger:				
1.92	Heating water		[m^3/h]	1.28

Specification of conditions:

Compressor speed control	**Variable**	Heating water volume flow rate (indoor heat exchanger)	**Fixed**
Outlet water temperature (indoor heat exchanger)	**Variable**	Source liquid volume flow rate (outdoor heat exchanger)	**Variable**
Function	**Reversible**		

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 Testing Laboratory 1045.1.

Brno, 2024-02-20

Ing. Mario Jankola
Heating Equipment and Construction Products Manager

– 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

UWIERZYTELNIONE TŁUMACZENIE Z JĘZYKA ANGIELSKIEGO

Strojirenský zkušebni ústav, s.p., Brno Česká republika
Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe, Brno, Republika Czeska

CERTYFIKAT Z BADAŃ
numer O-B-00317-24

Klient:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLSKA
Produkt:	Pompa ciepła powietrze/woda - monoblok
Rodzaj oznaczenia/znak towarowy:	**DEHER AIRTERM 22 ECO**
Metody badań:	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023 ČSN EN 14825:2023
Podstawa certyfikatu:	Raporty z badań: 39-17457/T z 2024-02-20 Dokumenty techniczne Deher Spółka z ograniczoną odpowiedzialnością
Referencyjny sezon grzewczy	"A" = średni (Temperatura obliczeniowa odniesienia $T_{designh}$ =-10°C)

Wyniki:

	TEMPERATURA NISKA (referencyjna temperatura wody 35° C)	**TEMPERATURA ŚREDNIA** (referencyjna temperatura wody 55° C)
13.22	$P_{designh}$ **[kW]**...Ogrzewanie przy pełnym obciążeniu	13.40
4.46	SCOP [-] Sezonowy współczynnik efektywności	3.36

Temperatura zewnętrzna T_j [°C]	Deklarowana wydajność grzewcza P_{dh} [kW]	Współczynnik efektywności przy deklarowanej wydajności COP_d [-]	Temperatura zewnętrzna T_j [°C]	Deklarowana wydajność grzewcza P_{dh} [kW]	Współczynnik efektywności przy deklarowanej wydajności COP_d [-]
T_j = -7	10.683	2.936	T_j = -7	10.720	1.878
T_j = +2	6.688	4.229	T_j = +2	6.576	3.340
T_j = +7	7.692	5.867	T_j = +7	7.325	4.593
T_j = +12	8.628	7.329	T_j = +12	8.495	5.194
T_j = TOL=-10	13.221	2.500	T_j = TOL=-10	13.402	1.879
T_j = $T_{bivalent}$ = -10	13.221	2.500	T_j = $T_{bivalent}$ = -10	13.402	1.879

Okrągła pieczęć w języku czeskim: Strojirenský zkušebni ústav, s.p., CZ 1

TEMPERATURA NISKA (Temperatura referencyjna wody 35°C)				TEMPERATURA ŚREDNIA (Temperatura referencyjna wody 55°C)
Pobór mocy w trybach innych niż "tryb aktywny"				
12.8	tryb wyłączenia	P_{OFF}	[W]	12.8
12.8	tryb wyłączenia termostatu	P_{TO}	[W]	12.8
12.8	tryb czuwania	P_{SB}	[W]	12.8
0	tryb włączonej grzałki karteru	P_{CK}	[W]	0
Roczne zużycie energii elektrycznej do ogrzewania zgodnie z:				
6131	ČSN EN 14825:2023	Q_{HE}	[kWh]	8241
Sezonowa efektywność energetyczna ogrzewania pomieszczeń				
175.2	ČSN EN 14825:2023	η_s	[%]	131.4
Natężenie przepływu cieczy w zewnętrznym wymienniku ciepła:				
-	Ciecz źródłowa	Min/Maks	[m^3/h]	-
Natężenie przepływu cieczy w wewnętrznym wymienniku ciepła:				
1.92	Woda grzewcza		[m^3/h]	1.28

Specyfikacja wymagań:

Kontrola prędkości sprężarki **Zmienna**

Natężenie przepływu wody grzewczej (wewnętrzny wymiennik ciepła) **Stałe**

Temperatura wody wylotowej (wewnętrzny wymiennik ciepła) **Zmienna**

Natężenie przypływu cieczy źródłowej (zewnętrzny wymiennik ciepła)

Funkcja: odwracalna

Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe potwierdza niniejszym Certyfikatem z badań, że przedmiotowy wyrób został przebadany i uzyskał wyniki wskazane powyżej. Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe jest akredytowanym laboratorium badawczym nr 1045.1.

Brno, 20 lutego 2024

Okrągła pieczęć w języku czeskim: Strojirenský zkušebni ústav, s.p., CZ 1

podpis nieczytelny
inż. Mario Jankola
Dyrektor ds urządzeń grzewczych i wyrobów budowlanych

- KONIEC CERTYFIKATU Z BADAŃ-

Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Państwowe, Hudcova 424/56b, 621 00 Brno, Republika Czeska
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Repertorium Nr ...101/2024

Potwierdzam zgodność niniejszego tłumaczenia z okazanym mi pierwopisem - ~~odpisem~~

w języku ...angielskim.....

Opłatę pobrano zgodnie z rozporządzeniem Ministra Sprawiedliwości z dnia 8 października 2019 (Dz. U. Nr 201 z 2019, poz. 1975) zmieniającego rozporządzenie Ministra Sprawiedliwości z dnia 24 stycznia 2005 r. w sprawie wynagrodzenia za czynności tłumacza przysięgłego (Dz. U. Nr 15 z 2005 r. poz. 131, Dz. U. Nr 41 z 2007 r. poz. 265 oraz Dz. U. Nr 221 z 2009 r. poz. 1746)

Siemianowice Śląskie, 26 lipca 2024

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
39-17765/H

Product:	Outdoor Air/Water Heat pump - monobloc
Type designation:	**DEHER Airterm 22 ECO**
Customer:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLAND
Manufacturer:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLAND
Report issue date:	2024-06-19
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

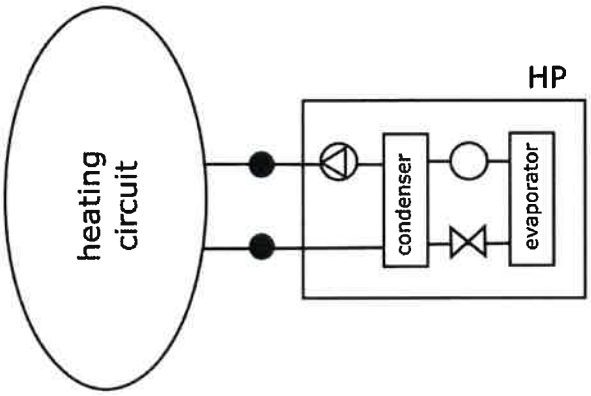
I. Description of product tested

The Heat pump **DEHER AIRTERM 22 ECO** supplied by the company **Deher Spółka z ograniczoną odpowiedzialnością** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor. Outdoor unit is connected by water pipes. Refrigerant R290 is used with charge 1.4 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 **DEHER AIRTERM 22 ECO**:

- Serial number CP-RW0600064 PPAL06023080350
- Cuboid shape with dimensions 1070 × 450 × 1380 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows, dimensions 950 × 20 × 1300 mm (W × D × H), spacing 2 mm
- Plate condenser, dimensions 130 × 85 × 340 mm (W × D × H) including insulation
- Compressor Highly WHP32900VSKTQ9JK, seriál number W82N1E031C31
- Refrigerant R290 (1.4 kg)
- Electric expansion valve Sanhua
- 4-way reversing valve Sanhua
- Refrigerant accumulator 145VW-B04-PW, Fo Shan Hong xin, serial number 2023007000800300
- Axial fan RD150HA, Jiangmen LT Motor Co., Ltd., serial number 000459
- Axial fan RD150HA, Jiangmen LT Motor Co., Ltd., seriál number 000467
- Pressure sensor Changzhou Sensata Technology Co., Ltd
- Pressure switch YK-01H
- Temperature sensors Guangdong Chico Electronics Co., Ltd
- Flow switch ACOL
- Refrigerant pipes
- Air vent
- Air conditioner reactor R20035L(AL)

Scheme:

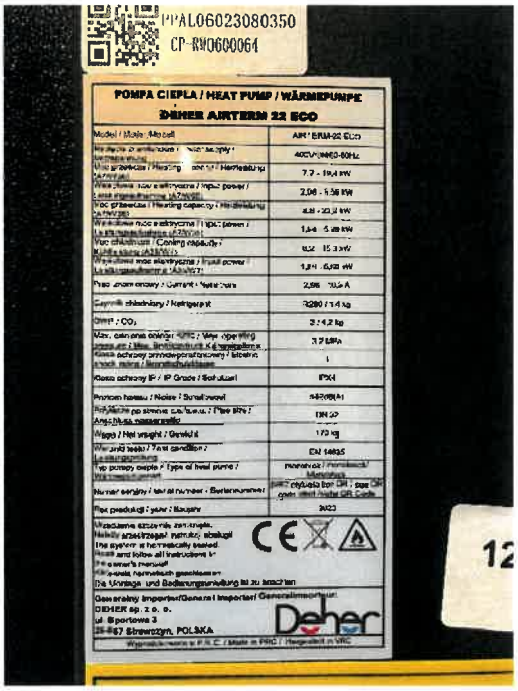


Photodocumentation:

Heat pump **DEHER AIRTERM 22 ECO**
- outdoor unit
– Front view –

Heat pump **DEHER AIRTERM 22 ECO**
- outdoor unit
– Back view –

Heat pump **DEHER AIRTERM 22 ECO**
- outdoor unit
– Compressor label –



Heat pump **DEHER AIRTERM 22 ECO**
- outdoor unit
– Label –

Heat pump **DEHER AIRTERM 22 ECO**
- outdoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.40096.001	Air/Water Heat pump **DEHER Airterm ECO 22**	2024-05-31

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	E2.1
2.	Digital watt meter	1.2.2 ENERGIE ANALYZATOR_2
3.	Flow meter Krohne Optiflux	8.1.2 TECH_K2_V_DN15
4.	Barometer	2.3 MAR18_1_PB
5.	Differential pressure gauge	3.2 MAR18_2_dP
6.	Thermometers	3.4 MAR18_T
7.	Tape measure	ME 475
8.	Multi-analyser SINUS SoundBook MK2	000-000-000-875/1
9.	Microphone pair G.R.A.S. 40 AK, wind deflector	000-000-000-875/2
10.	Microphone set G.R.A.S. 46AF, 1/2" LEMO7, wind deflectors	6035-OL-M0068-22 6035-OL-M0069-22 6035-OL-M0070-22 6035-OL-M0071-22 6035-OL-M0072-22 6035-OL-M0073-22 6035-OL-M0074-22 6035-OL-M0075-22 6035-OL-M0076-22 6035-OL-M0077-22

IV. Methods, results of tests and verifications

No.	Test objective	Requirement	Method of test	Documentation	Test evaluation/ verification *
1.	Determination of the sound power level – Heat pump water heaters	Articles 4 and 9	**ČSN EN ISO 12102-1:2023**	Page No. 7-15	+
3.	Determination of sound power levels using sound pressure	Article 8.2	**ČSN EN ISO 3744:2010**	Page No. 8-15	+

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

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

Note:
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*** - Noise characteristics measurement
Test method:	**ČSN EN ISO 12102-1:2023;** **ČSN EN ISO 3744:2010**
Sample tested:	Air/Water Heat pump **DEHER Airterm ECO 22**
Measuring equipment used:	see Chapter III
Place of test:	Engineering Test Institute, Hudcova 424/56b, 621 00 Brno, ČR

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)

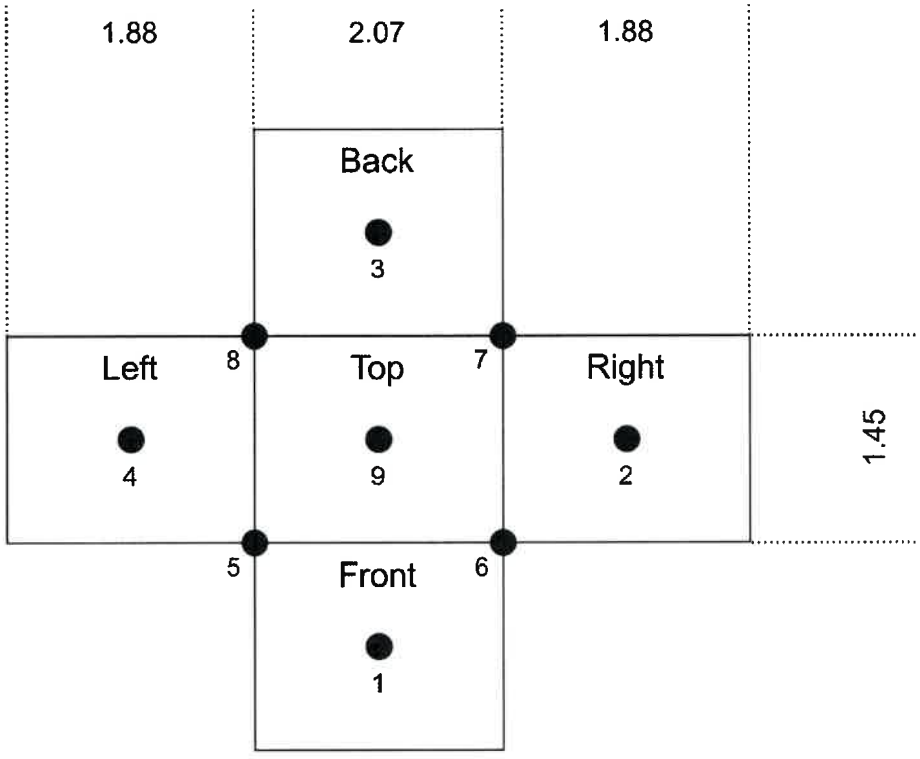
a) Measurement surface

Tested samples were surrounded by a cuboid-shape measuring surface set in distance d [m].The measurement surface and the microphone positions for the outdoor unit were set according to the ČSN EN ISO 3744:2010 standard. For visualisation of the measuring surfaces see the sketches below.

Test sample			**For outdoor unit**
Distance from the test sample	*d*	[m]	0.50
Height of measurement surface	*h*	[m]	1.88
Width of measurement surface	*w*	[m]	2.07
Depth of measurement surface	*l*	[m]	1.45
Total measurement surface area	*S*	[m^2]	16.34
Minimal measuring time	t_M	[s]	10x30.00

Sketch of measurement surface (not to scale):

Air/Water Heat pump
DEHER Airterm ECO 22
- Outdoor Unit -



b) Acoustic environment

The device under test was placed inside a climate chamber (dimensions shown below). The chamber was acoustically treated to be compliant with ČSN EN ISO 3745:2012 requirements for hemi-anechoic chambers. 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 varying the measurement distance and positions.

Climate-acoustic chamber *(Corresponds to free-field over a reflecting plane*)*			**For outdoor unit**
Chamber width	l_1	[m]	3.75
Chamber length	l_2	[m]	4.50
Chamber height	l_3	[m]	4.25
Chamber surface	S_V	[m²]	103.88
Sound absorption coefficient	α	[-]	1.00
Environmental correction	K_{2A}	[dB]	0.00*)

Note:

*) *The acoustic environment complies with requirements of ISO 3745:2012 standard and thus no environmental correction is used.*

c) Measured and calculated data – General overview:

The measured values are in accordance with **ČSN EN 12102-1:2023**			YES
The measured values are in accordance with **ČSN EN ISO 3744:2010**			YES
Operation mode			Heating
Specification of the assessment condition			A7/W55*)
Type of HP capacity regulation			Inverter
Control settings of heat pump / compressor			34 Hz
Fan speed settings [rpm]			400 rpm
Test sample			Air/Water Heat pump **DEHER Airterm ECO 22** – Outdoor unit –
Date of testing (YYYY-MM-DD)			2024-06-05
Reference air temperature	t	[°C]	7.0
Relative humidity of air	RH	[%]	86.7
Ambient pressure	p_{amb}	[hPa]	989.5
Sound pressure level DUT and background noise difference	ΔL_{pA}	[dB]	13.8
Background noise correction	K_{1A}	[dB]	0.2
Overall A-weighted sound pressure level	L_{pA}	[dB(A)]	46.3 ± 3.0
Overall A-weighted sound power level	L_{WA}	**[dB(A)]**	**58.4 ± 3.0**
Accuracy class			**Engineering** **(Grade 2)**

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

1A) Outdoor unit, Sound pressure per microphone position

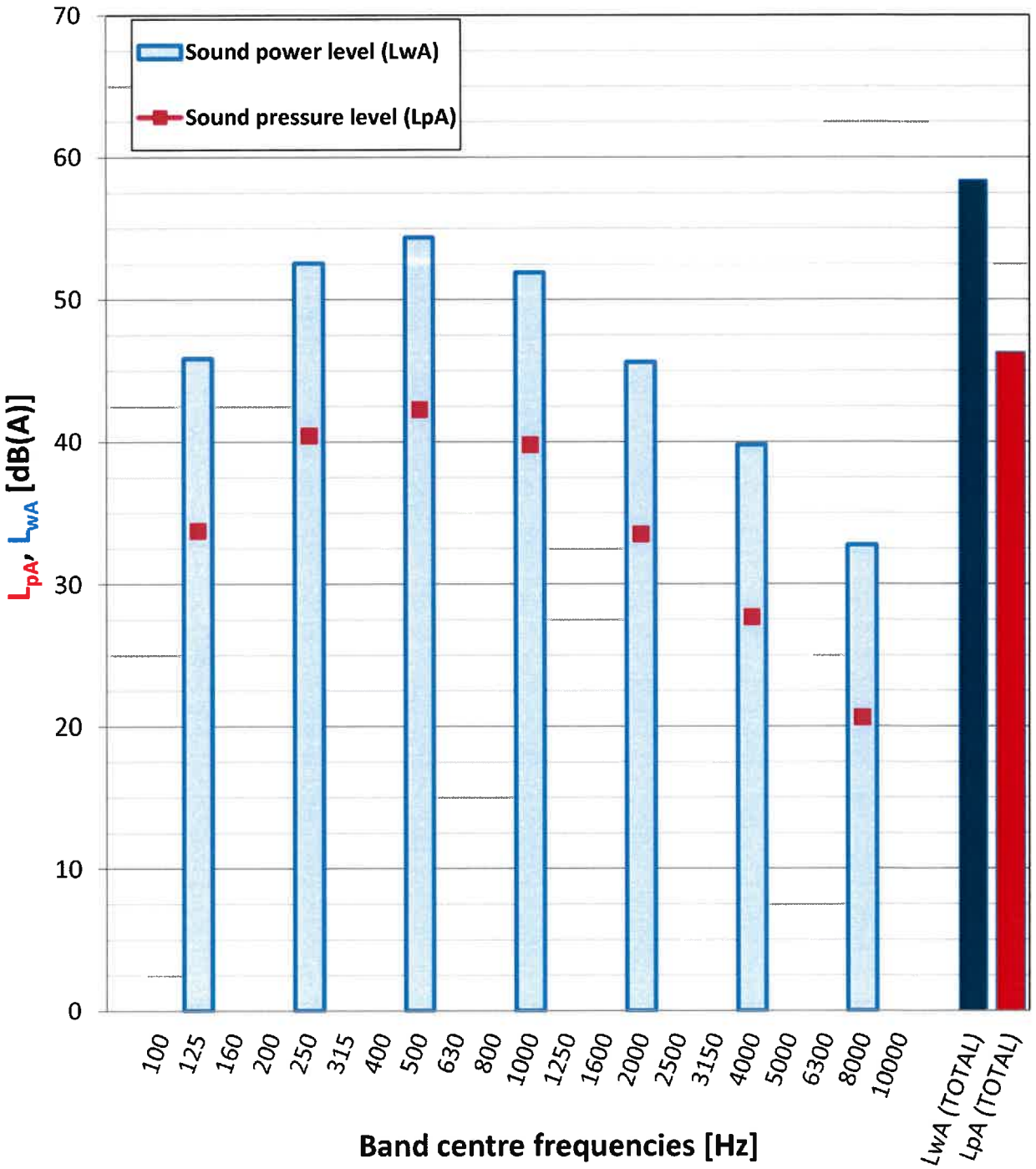
Microphone position	Partial measurement surface	Background noise	Source noise *(incl. background)*	Uncertainty
	S_i [m²]	$L_{pAi'(B)}$ [dB(A)]	$L_{pAi'(ST)}$ [dB(A)]	U [dB(A)]
Air/Water Heat pump **DEHER Airterm ECO 22** (Outdoor unit) *A7/W55* *Compressor: 34 Hz, Fan:400 rpm*				
1 (front)	1.80	32.66	50.51	± 3.00
2 (right)	1.80	31.92	48.62	± 3.00
3 (back)	**1.80**	**35.62**	**51.93**	**± 3.00**
4 (left)	1.80	34.40	49.85	± 3.00
5 (top left front)	1.80	35.26	44.79	± 3.00
6 (top right front)	1.80	31.52	43.80	± 3.00
7 (top right back)	1.80	35.92	44.53	± 3.00
8 (top left back)	1.80	36.33	44.49	± 3.00
9 (top)	1.80	32.64	47.38	± 3.00

1B) Outdoor unit, Measurement results – octave bands

f_m	Air/Water Heat pump **DEHER Airterm ECO 22** (Outdoor unit) *A7/W55* *Compressor: 34 Hz, Fan:400 rpm*		**U**
	L_{pA}	L_{WA}	
[Hz]	[dB]	[dB(A)]	[dB]
125	33.7	45.8	± 3.0
250	40.4	52.5	± 2.1
500	**42.3**	**54.4**	**± 1.6**
1 000	39.8	51.9	± 1.6
2 000	33.5	45.6	± 1.6
4 000	27.7	39.8	± 1.6
8 000	20.6	32.7	± 2.5
Sum	**46.3**	**58.4**	**± 3.0**

1C) Outdoor unit, Spectrum of Sound power level L_W – octave bands

Air/Water Heat pump **DEHER Airterm ECO 22** (Outdoor unit) *A7/W55* *Compressor: 34 Hz, Fan:400 rpm*	**Engineering (Grade 2)**

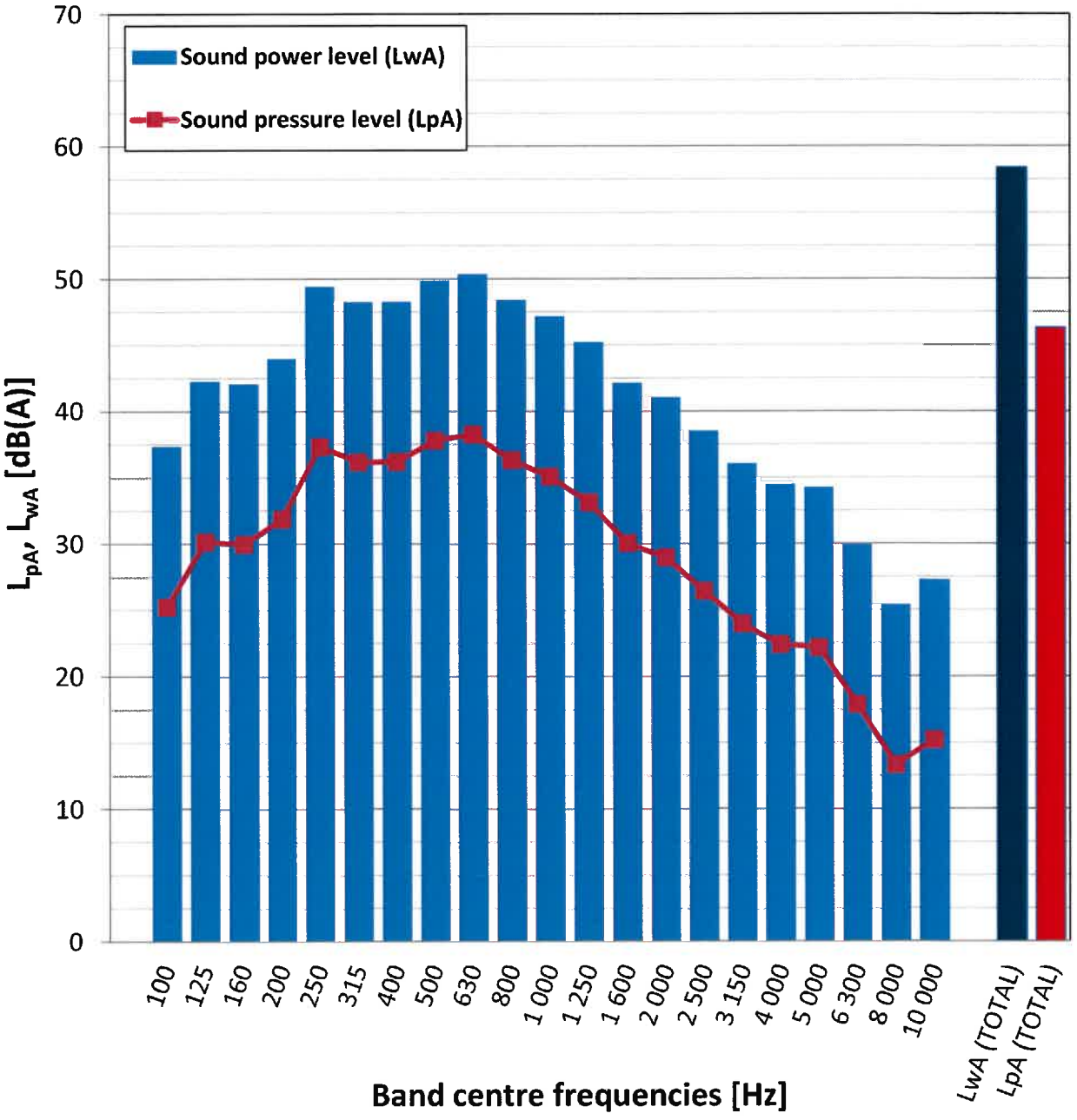


2B) **Outdoor unit, Measurement results** – third octave bands

f_m	Air/Water Heat pump **DEHER Airterm ECO 22** (Outdoor unit) *A7/W55* *Compressor: 34 Hz, Fan:400 rpm*		**U**
	L_{pA}	L_{WA}	
[Hz]	[dB]	[dB(A)]	[dB]
100	25.3	37.4	± 3.0
125	30.2	42.3	± 3.0
160	30.0	42.1	± 3.0
200	31.9	44.0	± 2.1
250	37.3	49.4	± 2.1
315	36.2	48.3	± 2.1
400	36.2	48.3	± 1.6
500	37.8	49.9	± 1.6
630	**38.3**	**50.4**	**± 1.6**
800	36.3	48.4	± 1.6
1 000	35.1	47.2	± 1.6
1 250	33.1	45.2	± 1.6
1 600	30.0	42.1	± 1.6
2 000	29.0	41.1	± 1.6
2 500	26.4	38.5	± 1.6
3 150	23.9	36.1	± 1.6
4 000	22.4	34.5	± 1.6
5 000	22.1	34.2	± 1.6
6 300	17.9	30.0	± 2.5
8 000	13.3	25.4	± 2.5
10 000	15.2	27.3	± 2.5
Sum	**46.3**	**58.4**	**± 3.0**

2C) Outdoor unit, Spectrum of Sound power level L_W – third octave bands

Air/Water Heat pump **DEHER Airterm ECO 22** (Outdoor unit) *A7/W55* *Compressor: 34 Hz, Fan:400 rpm*	**Engineering (Grade 2)**



Tested by: Ing. Ondrej Bilkovič Date: 2024-06-25 Signed:

Reviewed and approved by: Ing. Antonín Kolbábek, Ph.D. Date: 2024-06-25 Signed:

V. A list of referenced documents

- Order of 2024-05-24 (Order reg. no. B-82305, received on 2024-05-24)
- Contract B-82305/39

- ČSN ISO 3744:2011 - Acoustics - Determination of sound power levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane
- 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 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 and process chillers, with electrically driven compressors - Part 3: Test methods
- ČSN EN 14511-4:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 4: Requirements
- 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 SZÚ task no. 39-17765
- Measurement record file 39-17765-H.zip

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

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

– End of Test Report –

TŁUMACZ PRZYSIĘGŁY
j. angielskiego i j. niemieckiego
mgr JERZY DOMŻOŁ
ul. Fojkisa 8a/1, 41-103 Siemianowice Śl
tel/fax 032 2286773 kom.0604 504 119

UWIERZYTELNIONE TŁUMACZENIE
Z JĘZYKA ANGIELSKIEGO

Laboratorium Badawcze 1045.1 akredytowane przez Czeski Instytut Akredytacji według ČSN EN ISO/IEC 17025:2018

Strojirenský zkušebni ústav, s.p., Zkušebni laboratoř
(Instytut Badawczy Przemysłu Maszynowego, Przedsiębiorstwo Publiczne, Laboratorium Badawcze)
Hudcova 424/56b, Medlánky, 621 00 Brno

Nadruk o treści: ilac-MRA
Nadruk o treści: L 1045.1

RAPORT Z BADAŃ 39-17765/H

Produkt:	Zewnętrzna pompa ciepła powietrze/woda - monoblok
Rodzaj oznaczenia:	**DEHER Airterm 22 ECO**
Klient:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLSKA
Producent:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLSKA
Data wydania raportu:	2024-06-19
Rozdzielnik:	1 kopia dla klienta 1 kopia dla Instytutu Badawczego Przemysłu Maszynowego

c) Zmierzone i skalkulowane dane - Zarys ogólny:

Mierzone wartości są zgodne z ČSN EN 12102-1:2023	TAK		
Mierzone wartości są zgodne z ČSN EN ISO 3744:2010	TAK		
Tryb pracy	Ogrzewanie		
Warunki techniczne oceny	A7/W55*)		
Rodzaj regulacji wydajności pompy ciepła	Inwertor		
Ustawienia kontrolne pompy ciepła/sprężarki	34 Hz		
Ustawienia prędkości wentylatora [rpm]	400 rpm		
Próbka	Pompa ciepła powietrze/woda **DEHER Airterm ECO 22** - urządzenie zewnętrzne -		
Data badania	2024-06-05		
Referencyjna temperatura powietrza	t	[°C]	7.0
Wilgotność względna powietrza	RH	[%]	86.7
Ciśnienie otoczenia	p_{amb}	[hPa]	989.5
Poziom mocy akustycznej testowanego urządzenia i różnica tła akustycznego	ΔL_{pa}	[dB]	13.8
Korekta tła akustycznego	K_{1A}	[dB]	0.2
Całkowity ważony poziom ciśnienia akustycznego w odniesieniu do A	L_{pa}	[dB(A)]	46.3 ± 3.0
Całkowity ważony poziom mocy akustycznej w odniesieniu do A	**L_{WA}**	**[dB(A)]**	**58.4 ± 3.0**
Klasa dokładności	**Metoda techniczna (klasa 2)**		

(*) Komentarz do skróconego oznakowania: np. A7/W55
A(powietrze), 7 (powietrze wejściowe, temperatura suchego termometru w °C)/W (woda), 55 (temperatura wody grzewczej na wylocie w °C)

V. Lista dokumentów referencyjnych

- Zamówienie z dnia 2024-05-24 (Nr zamówienia B-82305, otrzymane dnia 2024-05-24)
- Umowa B-82305/39

- ČSN ISO 3744:2011 - Akustyka - Wyznaczanie poziomów mocy akustycznej i poziomów energii akustycznej źródeł hałasu na podstawie pomiarów ciśnienia akustycznego - Metody techniczne stosowane w warunkach zbliżonych do pola swobodnego nad płaszczyzną odbijającą dźwięk
- ČSN EN 12102-1:2023 - Klimatyzatory, agregaty do chłodzenia cieczy, pompy ciepła, ziębiarki do procesów przemysłowych i osuszacze z elektrycznie napędzanymi sprężarkami Wyznaczanie poziomu mocy akustycznej - Część 1: Klimatyzatory, agregaty do chłodzenia cieczy, pompy ciepła do ogrzewania i chłodzenia pomieszczeń, osuszacze i ziębiarki do procesów przemysłowych

- ČSN EN 14511-2:2023 - Klimatyzatory, agregaty chłodzące ciecz i pompy ciepła do ogrzewania i chłodzenia pomieszczeń i chłodziarki procesowe ze sprężarkami o napędzie elektrycznym - Część 2: Warunki badań
- ČSN EN 14511-3:2023 - Klimatyzatory, agregaty chłodzące ciecz i pompy ciepła do ogrzewania i chłodzenia pomieszczeń i chłodziarki procesowe ze sprężarkami o napędzie elektrycznym - Część 3: Metody badań
- ČSN EN 14511-4:2023 - Klimatyzatory, agregaty chłodzące ciecz i pompy ciepła do ogrzewania i chłodzenia pomieszczeń i chłodziarki procesowe ze sprężarkami o napędzie elektrycznym - Część 4: Wymagania
- ČSN EN 14825:2023 - Klimatyzatory, agregaty do chłodzenia cieczy oraz pompy ciepła ze sprężarkami o napędzie elektrycznym do ogrzewania i chłodzenia pomieszczeń - Badanie obciążenia oraz obliczanie wydajności sezonowej

- Uwarunkowanie SZÚ dla próby nr 39-17765
- Plik z dokumentacją pomiarową 39-17765-H.zip

Raport z badań sporządził: **inż.Ondrej Bilkovič**

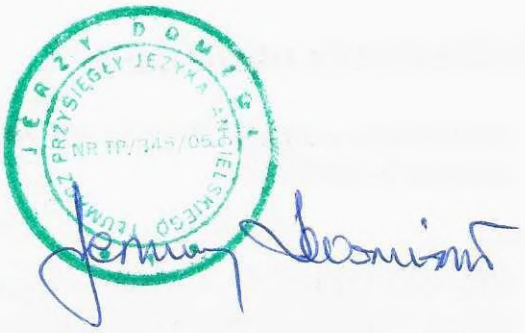
podpis nieczytelny

Raport z badań zatwierdził: **dr inż. Antonin Kolbábek**
Kierownik ds urządzeń hydraulicznych i ciśnieniowych

Okrągła pieczęć o następującej treści: Akredytowane Laboratorium Badawcze nr 1045.1
Strojírenský Zkušební Ústav s.p.

- Koniec Raportu z badań -

Repertorium Nr 104/2024
Potwierdzam zgodność niniejszego tłumaczenia z okazanym mi pierwopisem - ~~odpisem~~
w języku angielskim.....



Opłatę pobrano zgodnie z rozporządzeniem Ministra Sprawiedliwości z dnia 8 października 2019 (Dz. U. Nr 201 z 2019, poz. 1975) zmieniającego rozporządzenie Ministra Sprawiedliwości z dnia 24 stycznia 2005 r. w sprawie wynagrodzenia za czynności tłumacza przysięgłego (Dz. U. Nr 15 z 2005 r. poz. 131, Dz. U. Nr 41 z 2007 r. poz. 265 oraz Dz. U. Nr 221 z 2009 r. poz. 1746)

Siemianowice Śląskie, 26lipca 2024

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
39-17457/T

Product:	Outdoor Air/Water Heat Pumps – monobloc
Type designation:	DEHER AIRTERM 22 ECO
Customer:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLAND
Manufacturer:	Deher Spółka z ograniczoną odpowiedzialnością Sportowa 3 26-067 Strawczyn POLAND
Report issue date:	2024-02-20
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

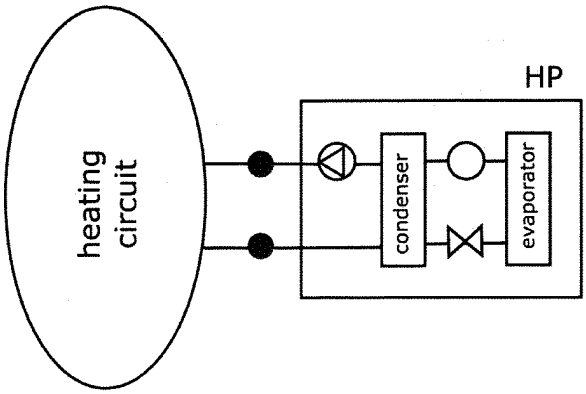
I. Description of product tested

The Heat pump DEHER AIRTERM 22 ECO supplied by the company **Deher Spółka z ograniczoną odpowiedzialnością** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor. Outdoor unit is connected by water pipes. Refrigerant R290 is used with charge 1.4 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.

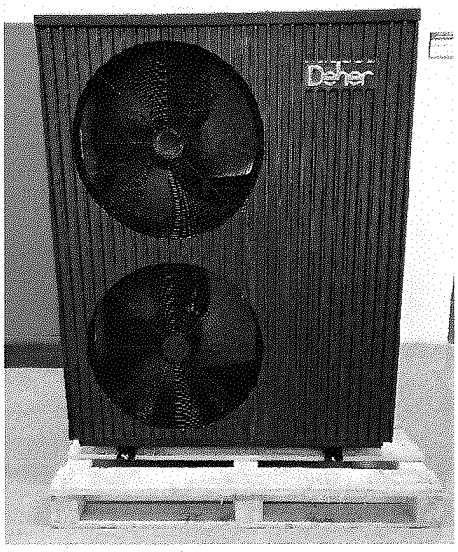
Main components of the outdoor unit **DEHER AIRTERM 22 ECO**:

- Serial number CP-RW0600064 PPAL06023080350
- Cuboid shape with dimensions 1070 × 450 × 1380 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows, dimensions 950 × 20 × 1300 mm (W × D × H), spacing 2 mm
- Plate condenser, dimensions 130 × 85 × 340 mm (W × D × H) including insulation
- Compressor Highly WHP32900VSKTQ9JK, seriál number W82N1E031C31
- Refrigerant R290 (1.4 kg)
- Electric expansion valve Sanhua
- 4-way reversing valve Sanhua
- Refrigerant accumulator 145VW-B04-PW, Fo Shan Hong xin, serial number 2023007000800300
- Axial fan RD150HA, Jiangmen LT Motor Co., Ltd., serial number 000459
- Axial fan RD150HA, Jiangmen LT Motor Co., Ltd., seriál number 000467
- Pressure sensor Changzhou Sensata Technology Co., Ltd
- Pressure switch YK-01H
- Temperature sensors Guangdong Chico Electronics Co., Ltd
- Flow switch ACOL
- Refrigerant pipes
- Air vent
- Air conditioner reactor R20035L(AL)

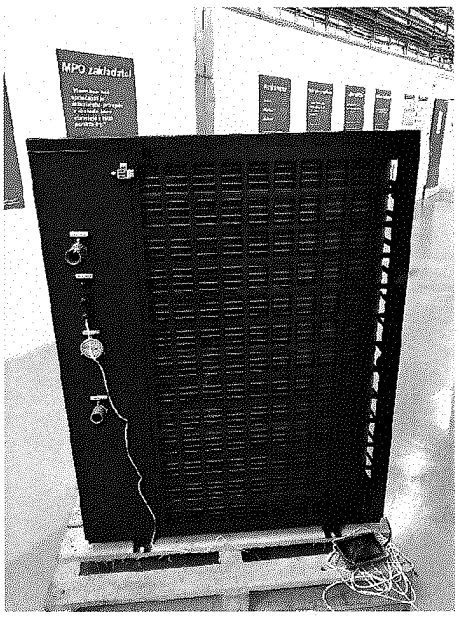
Scheme:



Photodocumentation:

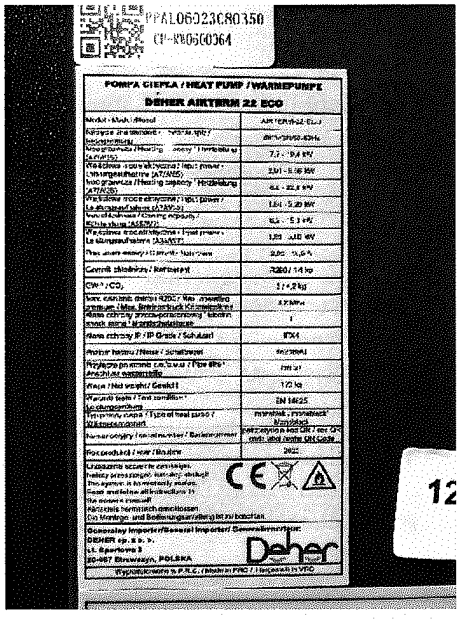


Heat pump DEHER AIRTERM 22 ECO
- outdoor unit
– Front view –

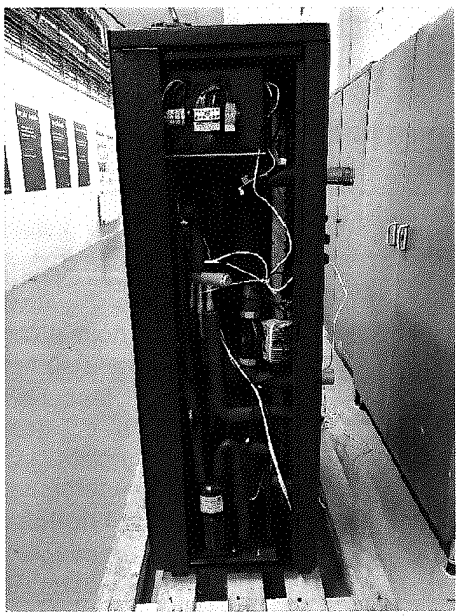


Heat pump DEHER AIRTERM 22 ECO
- outdoor unit
– Back view –

Heat pump DEHER AIRTERM 22 ECO
- outdoor unit
– Compressor label –



Heat pump DEHER AIRTERM 22 ECO
- outdoor unit
– Label –



Heat pump DEHER AIRTERM 22 ECO
- outdoor unit
– Without cover –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.39455.001	DEHER AIRTERM 22 ECO	2024-01-17

The visual inspection, tests and verification were carried out by Ing. Alexandr Jordanov and Ing. Dominik Šedivý, PhD. 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 022370/12
8.	Thermometer	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 14511-3:2023	Page No. 7-8	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.

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 DEHER AIRTERM 22 ECO
Measuring equipment used:	see Chapter III

Specification of the assessment condition*		**A7/W35**	**A7/W55**	**A2/W35**
Date of testing		**2024-01-22**	**2024-01-23**	**2024-01-31**
Transient test procedure	YES / NO	NO	NO	YES
Average defrost time of 1 cycle	[min]	–	–	4.6
Average time of 1 cycle	[min]	–	–	162.5
Calculation time	[min]	70.0	70.0	162.5
Output heating water – temperature calculation	[°C]	35.09	55.02	34.73
Input heating water – temperature calculation	[°C]	30.00	47.00	31.66
Output heating water temperature	[°C]	35.09	55.02	34.97
Input heating water temperature	[°C]	30.00	47.00	31.70
Air temperature – dry bulb temperature	[°C]	7.18	7.10	2.04
Air temperature – wet bulb temperature	[°C]	6.12	6.09	1.02
Relative humidity	[%]	86.16	86.82	83.31
Barometric pressure	[kPa]	98.909	99.237	100.048
Ambient temperature	[°C]	7.18	7.10	2.04
Secondary circuit pressure difference	[kPa]	2.596	10.300	2.001
Efficiency of the secondary liquid pump	[–]	0.130	0.160	0.126
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	1.9179	1.2875	1.9242
Density of heating water	$[kg \cdot m^{-3}]$	993.9	985.8	994.0
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.175	4.178	4.175
Voltage	[V]	399.88	399.32	399.66
Total current	[A]	13.40	19.37	9.97
Overall power input	[kW]	2.378	3.835	1.813
Capacity correction of sec. liquid pump	[W]	9.253	19.405	7.422
Power input correction of sec. liquid pump	[W]	10.64	23.09	8.49
Heating capacity – heating water	[kW]	11.248	11.812	6.824
Corrected heating capacity – heating water	**[kW]**	**11.239**	**11.792**	**6.816**
Uncertainty of corrected heating capacity	[kW]	± 0.189	± 0.127	± 0.189
Effective electric power input	**[kW]**	**2.368**	**3.812**	**1.804**
COP	**[–]**	**4.747**	**3.094**	**3.778**
Uncertainty of COP	[–]	± 0.080	± 0.033	± 0.105
Control settings	**[Hz]**	**45**	**52**	**35**
Circulation pump settings – heating water	[–]	ON	ON	ON

Specification of the assessment condition*		**A2/W55**	**A-7/W35**	**A-7/W55**
Date of testing		**2024-01-30**	**2024-01-31**	**2024-01-30**
Transient test procedure	YES / NO	NO	YES	YES
Average defrost time of 1 cycle	[min]	–	5.3	3.9
Average time of 1 cycle	[min]	–	158.0	160.8
Calculation time	[min]	70.0	158.0	160.8
Output heating water – temperature calculation	[°C]	55.00	34.60	54.59
Input heating water – temperature calculation	[°C]	50.39	29.58	47.88
Output heating water temperature	[°C]	55.00	34.96	54.97
Input heating water temperature	[°C]	50.39	29.65	47.93
Air temperature – dry bulb temperature	[°C]	2.02	-6.94	-6.94
Air temperature – wet bulb temperature	[°C]	1.00	-7.94	-7.86
Relative humidity	[%]	83.34	74.94	76.68
Barometric pressure	[kPa]	100.230	100.250	100.394
Ambient temperature	[°C]	2.02	-6.94	-6.94
Secondary circuit pressure difference	[kPa]	10.179	3.045	10.601
Efficiency of the secondary liquid pump	[–]	0.159	0.133	0.161
Volume flow rate of heating water	[m3·h-1]	1.2913	1.9208	1.2909
Density of heating water	[kg·m-3]	985.8	994.1	986.0
Specific heat capacity of heating water	[kJ·kg-1·K-1]	4.178	4.175	4.178
Voltage	[V]	399.68	399.26	398.87
Total current	[A]	14.13	20.12	24.65
Overall power input	[kW]	2.561	3.948	5.017
Capacity correction of sec. liquid pump	[W]	19.293	10.564	19.803
Power input correction of sec. liquid pump	[W]	22.94	12.19	23.60
Heating capacity – heating water	[kW]	6.811	11.135	9.913
Corrected heating capacity – heating water	**[kW]**	**6.792**	**11.124**	**9.894**
Uncertainty of corrected heating capacity	[kW]	± 0.126	± 0.189	± 0.127
Effective electric power input	**[kW]**	**2.538**	**3.935**	**4.994**
COP	**[–]**	**2.676**	**2.827**	**1.981**
Uncertainty of COP	[–]	± 0.050	± 0.048	± 0.025
Control settings	**[Hz]**	**35**	**70**	**70**
Circulation pump settings – heating water	[–]	ON	ON	ON

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 DEHER AIRTERM 22 ECO
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		**175.2**	**%**	
		Warmer	η_s		-	%	
		Colder	η_s		-	%	
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**		**4.46**	**–**	
		Warmer	SCOP		-	–	
		Colder	SCOP		-	–	
Function	Cooling				-		
	Heating	Yes	Reference heating season	Average	Yes		
				Warmer	-		
				Colder	-		
Full heating load	Cooling		$P_{designc}$		–	kW	
	Heating	Average	$P_{designh}$		13.22	kW	
		Warmer	$P_{designh}$		-	kW	
		Colder	$P_{designh}$		-	kW	
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-10	°C	
		Warmer	$T_{bivalent}$		-	°C	
		Colder	$T_{bivalent}$		-	°C	
Operation limit temperatures	Heating	Average	TOL		-	°C	
		Warmer	TOL		-	°C	
		Colder	TOL		-	°C	
Seasonal power consumption according to ČSN EN 14825:2023	Cooling		Q_{CE}		–	kWh	
	Heating	Average	Q_{HE}		6131	kWh	
		Warmer	Q_{HE}		-	kWh	
		Colder	Q_{HE}		-	kWh	
Modes other than „active mode“	Off mode			P_{OFF}	12.8	W	
	Thermostat off mode			P_{TO}	12.8	W	
	Standby mode			P_{SB}	12.8	W	
	Crankcase heater mode			P_{CK}	0	W	

(Not tested): The technical data were declared by the Manufacturer and were not tested by the Testing Laboratory.

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/heating only 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}	0.0128	[kW]
P_{SB}	0.0128	[kW]
P_{CK}	0	[kW]
P_{OFF}	0.0128	[kW]
$P_{designh}$	13.22	[kW]
$SCOP_{ON}$	4.46	[–]

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]

$Q_H = 13.22 \cdot 2066 = 27315$ [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]

$Q_{HE} = 27315 / 4.46 + 178 \cdot 0.0128 + 0 \cdot 0.0128 + 178 \cdot 0 + 0 \cdot 0.0128 = 6131$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 27315 / 6131 = 4.46$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

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

$\eta_s (A) = (1 / 2.5) \cdot 4.46 – 0.03 = 1.752$ [–]

Temperature level		Low (reference water temperature 35 °C)		
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)		
Assessment condition		**A**	**B**	**C**
Specification of the assessment condition*		**A-7/W34**	**A2/W30**	**A7/W28.39**
Date of testing		**2024-01-26**	**2024-01-29**	**2024-01-25**
Transient test procedure	YES / NO	YES	YES	NO
Average defrost time of 1 cycle	[min]	4.4	4.2	–
Average time of 1 cycle	[min]	97.0	96.3	–
Calculation time	[min]	97.0	96.3	70.0
Output heating water – temperature calculation	[°C]	33.52	29.60	28.42
Input heating water – temperature calculation	[°C]	28.71	26.58	24.96
Output heating water temperature	[°C]	33.94	29.96	28.42
Input heating water temperature	[°C]	28.74	26.67	24.96
Air temperature – dry bulb temperature	[°C]	-6.86	1.99	7.05
Air temperature – wet bulb temperature	[°C]	-7.87	0.99	6.00
Relative humidity	[%]	74.96	83.76	86.14
Barometric pressure	[kPa]	99.457	100.529	99.229
Ambient temperature	[°C]	-6.86	1.99	7.05
Secondary circuit pressure difference	[kPa]	2.785	2.427	2.781
Efficiency of the secondary liquid pump	[–]	0.131	0.129	0.131
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.9256	1.9211	1.9234
Density of heating water	[$kg \cdot m^{-3}$]	994.4	995.6	996.0
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.176	4.177	4.177
Voltage	[V]	399.45	400.10	399.97
Total current	[A]	18.22	9.03	7.55
Overall power input	[kW]	3.650	1.592	1.322
Capacity correction of sec. liquid pump	[W]	9.845	8.753	9.827
Power input correction of sec. liquid pump	[W]	11.33	10.05	11.31
Heating capacity – heating water	[kW]	10.693	6.696	7.702
Corrected heating capacity – heating water	**[kW]**	**10.683**	**6.688**	**7.692**
Uncertainty of corrected heating capacity	[kW]	± 0.189	± 0.189	± 0.189
Effective electric power input	**[kW]**	**3.638**	**1.582**	**1.311**
COP	**[–]**	**2.936**	**4.229**	**5.867**
Uncertainty of COP	[–]	± 0.052	± 0.119	± 0.144
Control settings	**[Hz]**	**70**	**35**	**30**
Circulation pump settings – heating water	[–]	ON	ON	ON

Temperature level		Low (reference water temperature 35 °C)	
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)	
Assessment condition		**D**	**TOL(E), Tbiv (F)**
Specification of the assessment condition*		**A12/W26.93**	**A-10/W35**
Date of testing		**2024-01-26**	**2024-01-25**
Transient test procedure	YES / NO	NO	YES
Average defrost time of 1 cycle	[min]	–	4.3
Average time of 1 cycle	[min]	–	157.8
Calculation time	[min]	70.0	157.8
Output heating water – temperature calculation	[°C]	26.92	34.63
Input heating water – temperature calculation	[°C]	23.03	28.68
Output heating water temperature	[°C]	26.92	34.91
Input heating water temperature	[°C]	23.03	28.65
Air temperature – dry bulb temperature	[°C]	11.98	-9.87
Air temperature – wet bulb temperature	[°C]	10.92	-10.92
Relative humidity	[%]	88.19	68.65
Barometric pressure	[kPa]	99.050	99.041
Ambient temperature	[°C]	11.98	-9.87
Secondary circuit pressure difference	[kPa]	3.046	10.689
Efficiency of the secondary liquid pump	[–]	0.133	0.185
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	1.9205	1.9278
Density of heating water	$[kg \cdot m^{-3}]$	996.4	994.1
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.178	4.175
Voltage	[V]	399.90	399.17
Total current	[A]	7.17	25.61
Overall power input	[kW]	1.189	5.320
Capacity correction of sec. liquid pump	[W]	10.583	25.258
Power input correction of sec. liquid pump	[W]	12.21	30.98
Heating capacity – heating water	[kW]	8.639	13.246
Corrected heating capacity – heating water	**[kW]**	**8.628**	**13.221**
Uncertainty of corrected heating capacity	[kW]	± 0.189	± 0.190
Effective electric power input	**[kW]**	**1.177**	**5.289**
COP	**[–]**	**7.329**	**2.500**
Uncertainty of COP	[–]	± 0.161	± 0.036
Control settings	**[Hz]**	**30**	**90**
Circulation pump settings – heating water	[–]	ON	ON

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	11.70	10.683	2.936	0.900	1.00	2.936	–
B	2	30.00	53.85	7.12	6.688	4.229	0.900	1.00	4.229	–
C	7	28.39	34.62	4.58	7.692	5.867	0.990	0.59	5.828	0.0128
D	12	26.93	15.38	2.03	8.628	7.329	0.989	0.24	7.079	0.0128
TOL (E)	-10	35.00	100.00	13.22	13.221	2.500	0.900	1.00	2.500	–
Tbiv (F)	-10	35.00	100.00	13.22	13.221	2.500	0.900	1.00	2.500	–

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

- 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	8.628	[kW]
Declared capacity $_{standard\ rating\ condition\ A7/W35}$	11.239	[kW]
Part load	2.03	[kW]

Calculation of water temperature

$t_{outlet,\ capacity\ test,\ fixed\ flow} = 24 + 5 / 11.239 \cdot (8.628 - 2.03) =$ **26.93** [°C]

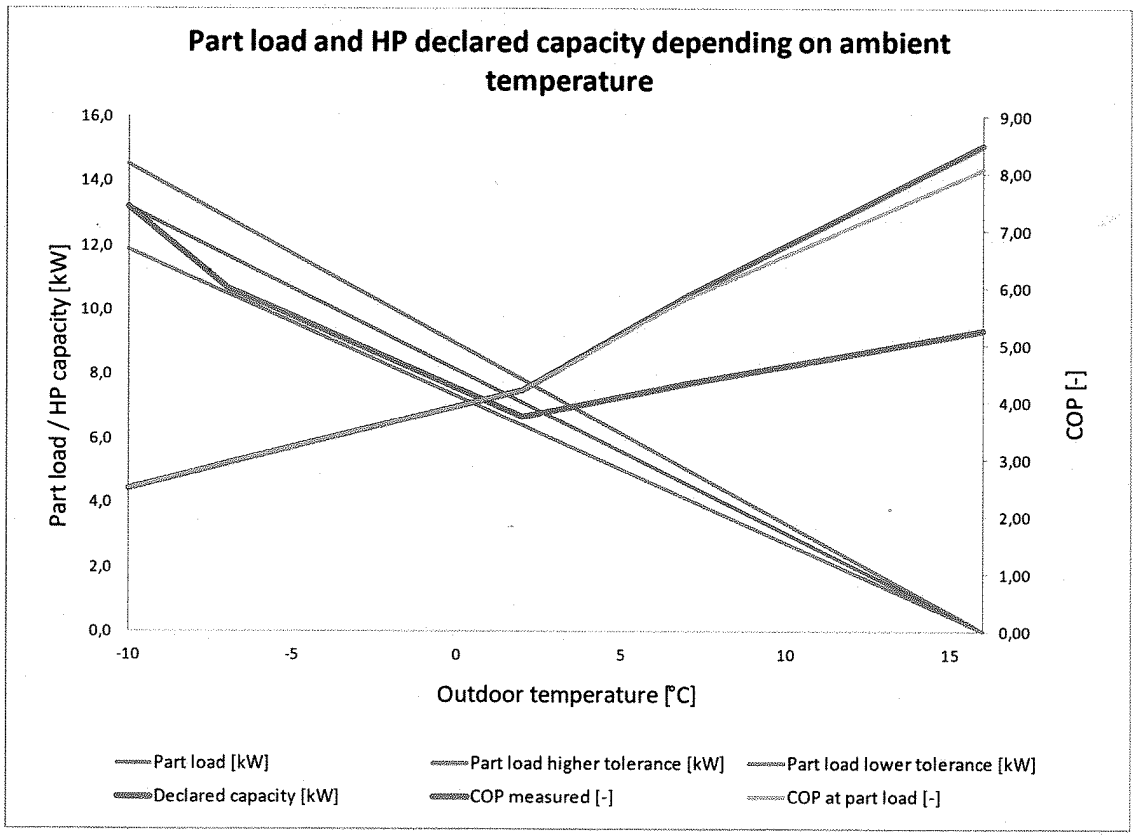
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$

- 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]
	21	-10	1	100.00	13.22	13.22	13.22	0.00	0.00	2.50	13	5	13	5
	22	-9	25	96.15	12.71	12.38	12.38	0.00	0.00	2.65	318	120	318	120
	23	-8	23	92.31	12.20	11.53	11.53	0.00	0.00	2.79	281	101	281	101
A	**24**	**-7**	**24**	**88.46**	**11.70**	**10.68**	**10.68**	**0.00**	**0.00**	**2.94**	**281**	**96**	**281**	**96**
	25	-6	27	84.62	11.19	10.24	10.24	0.00	0.00	3.08	302	98	302	98
	26	-5	68	80.77	10.68	9.80	9.80	0.00	0.00	3.22	726	225	726	225
	27	-4	91	76.92	10.17	9.35	9.35	0.00	0.00	3.37	925	275	925	275
	28	-3	89	73.08	9.66	8.91	8.91	0.00	0.00	3.51	860	245	860	245
	29	-2	165	69.23	9.15	8.46	8.46	0.00	0.00	3.65	1510	413	1510	413
	30	-1	173	65.38	8.64	8.02	8.02	0.00	0.00	3.80	1495	394	1495	394
	31	0	240	61.54	8.14	7.58	7.58	0.00	0.00	3.94	1953	495	1953	495
	32	1	280	57.69	7.63	7.13	7.13	0.00	0.00	4.08	2136	523	2136	523
B	**33**	**2**	**320**	**53.85**	**7.12**	**6.69**	**6.69**	**0.00**	**0.00**	**4.23**	**2278**	**539**	**2278**	**539**
	34	3	357	50.00	6.61	6.89	6.61	0.00	0.00	4.55	2360	519	2360	519
	35	4	356	46.15	6.10	7.09	6.10	0.00	0.00	4.87	2172	446	2172	446
	36	5	303	42.31	5.59	7.29	5.59	0.00	0.00	5.19	1695	327	1695	327
	37	6	330	38.46	5.09	7.49	5.09	0.00	0.00	5.51	1678	305	1678	305
C	**38**	**7**	**326**	**34.62**	**4.58**	**7.69**	**4.58**	**0.00**	**0.00**	**5.83**	**1492**	**256**	**1492**	**256**
	39	8	348	30.77	4.07	7.88	4.07	0.00	0.00	6.08	1416	233	1416	233
	40	9	335	26.92	3.56	8.07	3.56	0.00	0.00	6.33	1192	188	1192	188
	41	10	315	23.08	3.05	8.25	3.05	0.00	0.00	6.58	961	146	961	146
	42	11	215	19.23	2.54	8.44	2.54	0.00	0.00	6.83	547	80	547	80
D	**43**	**12**	**169**	**15.38**	**2.03**	**8.63**	**2.03**	**0.00**	**0.00**	**7.08**	**344**	**49**	**344**	**49**
	44	13	151	11.54	1.53	8.82	1.53	0.00	0.00	7.33	230	31	230	31
	45	14	105	7.69	1.02	9.00	1.02	0.00	0.00	7.58	107	14	107	14
	46	15	74	3.85	0.51	9.19	0.51	0.00	0.00	7.83	38	5	38	5
		Σ	4910							Σ	27310	6128	27310	6128

SCOPon	4.46	SCOPnet	4.46
		SCOP	**4.46**

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 DEHER AIRTERM 22 ECO
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		**131.4**	**%**
		Warmer	η_s		-	%
		Colder	η_s		-	%
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**		**3.36**	**–**
		Warmer	SCOP		-	–
		Colder	SCOP		-	–
Function	Cooling				-	
	Heating	Yes	Reference heating season	Average	Yes	
				Warmer	-	
				Colder	-	
Full heating load	Cooling		$P_{designc}$		–	kW
	Heating	Average	$P_{designh}$		13.40	kW
		Warmer	$P_{designh}$		-	kW
		Colder	$P_{designh}$		-	kW
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-10	°C
		Warmer	$T_{bivalent}$		-	°C
		Colder	$T_{bivalent}$		-	°C
Operation limit temperatures	Heating	Average	TOL		-	°C
		Warmer	TOL		-	°C
		Colder	TOL		-	°C
Seasonal power consumption according to ČSN EN 14825:2023	Cooling		Q_{CE}		–	kWh
	Heating	Average	Q_{HE}		8241	kWh
		Warmer	Q_{HE}		-	kWh
		Colder	Q_{HE}		-	kWh
Modes other than „active mode“	Off mode			P_{OFF}	12.8	W
	Thermostat off mode			P_{TO}	12.8	W
	Standby mode			P_{SB}	12.8	W
	Crankcase heater mode			P_{CK}	0	W

(Not tested): The technical data were declared by the Manufacturer and were not tested by the Testing Laboratory.

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/heating only 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}	0.0128	[kW]
P_{SB}	0.0128	[kW]
P_{CK}	0	[kW]
P_{OFF}	0.0128	[kW]
$P_{designh}$	13.40	[kW]
$SCOP_{ON}$	3.36	[–]

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]

$Q_H = 13.4 \cdot 2066 = 27689$ [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]

$Q_{HE} = 27689 / 3.36 + 178 \cdot 0.0128 + 0 \cdot 0.0128 + 178 \cdot 0 + 0 \cdot 0.0128 = 8241$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 27689 / 8241 = 3.36$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

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

$\eta_s (A) = (1 / 2.5) \cdot 3.36 – 0.03 = 1.314$ [–]

Temperature level		Medium (reference water temperature 55 °C)		
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)		
Assessment condition		**A**	**B**	**C**
Specification of the assessment condition*		**A-7/W52**	**A2/W42**	**A7/W37.79**
Date of testing		**2024-02-01**	**2024-01-24**	**2024-01-29**
Transient test procedure	YES / NO	YES	YES	NO
Average defrost time of 1 cycle	[min]	3.5	3.3	–
Average time of 1 cycle	[min]	100.9	125.0	–
Calculation time	[min]	100.9	125.0	70.0
Output heating water – temperature calculation	[°C]	51.31	41.59	37.81
Input heating water – temperature calculation	[°C]	44.06	37.11	32.84
Output heating water temperature	[°C]	51.89	41.98	37.81
Input heating water temperature	[°C]	44.14	37.20	32.84
Air temperature – dry bulb temperature	[°C]	-6.93	1.94	7.05
Air temperature – wet bulb temperature	[°C]	-7.96	0.96	6.00
Relative humidity	[%]	74.04	84.07	86.09
Barometric pressure	[kPa]	99.342	98.491	100.455
Ambient temperature	[°C]	15.44	1.94	7.05
Secondary circuit pressure difference	[kPa]	10.574	9.904	10.605
Efficiency of the secondary liquid pump	[–]	0.161	0.158	0.161
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.2921	1.2806	1.2818
Density of heating water	[$kg \cdot m^{-3}$]	987.5	991.6	993.0
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.177	4.175	4.175
Voltage	[V]	399.03	399.78	399.93
Total current	[A]	27.61	10.78	9.21
Overall power input	[kW]	5.733	1.991	1.618
Capacity correction of sec. liquid pump	[W]	19.784	18.845	19.720
Power input correction of sec. liquid pump	[W]	23.58	22.37	23.50
Heating capacity – heating water	[kW]	10.740	6.595	7.345
Corrected heating capacity – heating water	**[kW]**	**10.720**	**6.576**	**7.325**
Uncertainty of corrected heating capacity	[kW]	± 0.127	± 0.126	± 0.126
Effective electric power input	**[kW]**	**5.710**	**1.969**	**1.595**
COP	**[–]**	**1.878**	**3.340**	**4.593**
Uncertainty of COP	[–]	± 0.022	± 0.064	± 0.079
Control settings	**[Hz]**	**85**	**35**	**30**
Circulation pump settings – heating water	[–]	ON	ON	ON

Temperature level		Medium (reference water temperature 55 °C)	
Reference heating season		„A" = average ($T_{designh}$ = -10 °C)	
Assessment condition		**D**	**TOL(E), Tbiv (F)**
Specification of the assessment condition*		**A12/W34.30**	**A-10/W55**
Date of testing		**2024-01-24**	**2024-01-23**
Transient test procedure	YES / NO	NO	YES
Average defrost time of 1 cycle	[min]	–	–
Average time of 1 cycle	[min]	–	–
Calculation time	[min]	70.0	180.0
Output heating water – temperature calculation	[°C]	34.38	54.99
Input heating water – temperature calculation	[°C]	28.67	45.88
Output heating water temperature	[°C]	34.38	54.99
Input heating water temperature	[°C]	28.67	45.88
Air temperature – dry bulb temperature	[°C]	11.99	-9.95
Air temperature – wet bulb temperature	[°C]	10.93	-10.94
Relative humidity	[%]	88.31	70.24
Barometric pressure	[kPa]	98.710	99.442
Ambient temperature	[°C]	11.99	-9.95
Secondary circuit pressure difference	[kPa]	10.477	10.008
Efficiency of the secondary liquid pump	[–]	0.160	0.158
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.2919	1.2876
Density of heating water	[$kg \cdot m^{-3}$]	994.2	985.8
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.178
Voltage	[V]	399.97	398.74
Total current	[A]	9.69	33.77
Overall power input	[kW]	1.659	7.155
Capacity correction of sec. liquid pump	[W]	19.665	19.039
Power input correction of sec. liquid pump	[W]	23.42	22.62
Heating capacity – heating water	[kW]	8.515	13.421
Corrected heating capacity – heating water	**[kW]**	**8.495**	**13.402**
Uncertainty of corrected heating capacity	[kW]	± 0.127	± 0.127
Effective electric power input	**[kW]**	**1.636**	**7.132**
COP	**[–]**	**5.194**	**1.879**
Uncertainty of COP	[–]	± 0.078	± 0.018
Control settings	**[Hz]**	**30**	**90**
Circulation pump settings – heating water	[–]	ON	ON

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	11.86	10.720	1.878	0.900	1.00	1.878	–
B	2	42.00	53.85	7.22	6.576	3.340	0.900	1.00	3.340	–
C	7	37.79	34.62	4.64	7.325	4.593	0.992	0.63	4.572	0.0128
D	12	34.30	15.38	2.06	8.495	5.194	0.992	0.24	5.070	0.0128
TOL (E)	-10	55.00	100.00	13.40	13.402	1.879	0.900	1.00	1.879	–
Tbiv (F)	-10	55.00	100.00	13.40	13.402	1.879	0.900	1.00	1.879	–

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

- 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	8.495	[kW]
Declared capacity $_{standard\ rating\ condition\ A7/W55}$	11.972	[kW]
Part load	2.06	[kW]

Calculation of water temperature

$t_{outlet,\ capacity\ test,\ fixed\ flow} = 30 + 8 / 11.972 \cdot (8.495 - 2.06) = \mathbf{34.30}$ [°C]

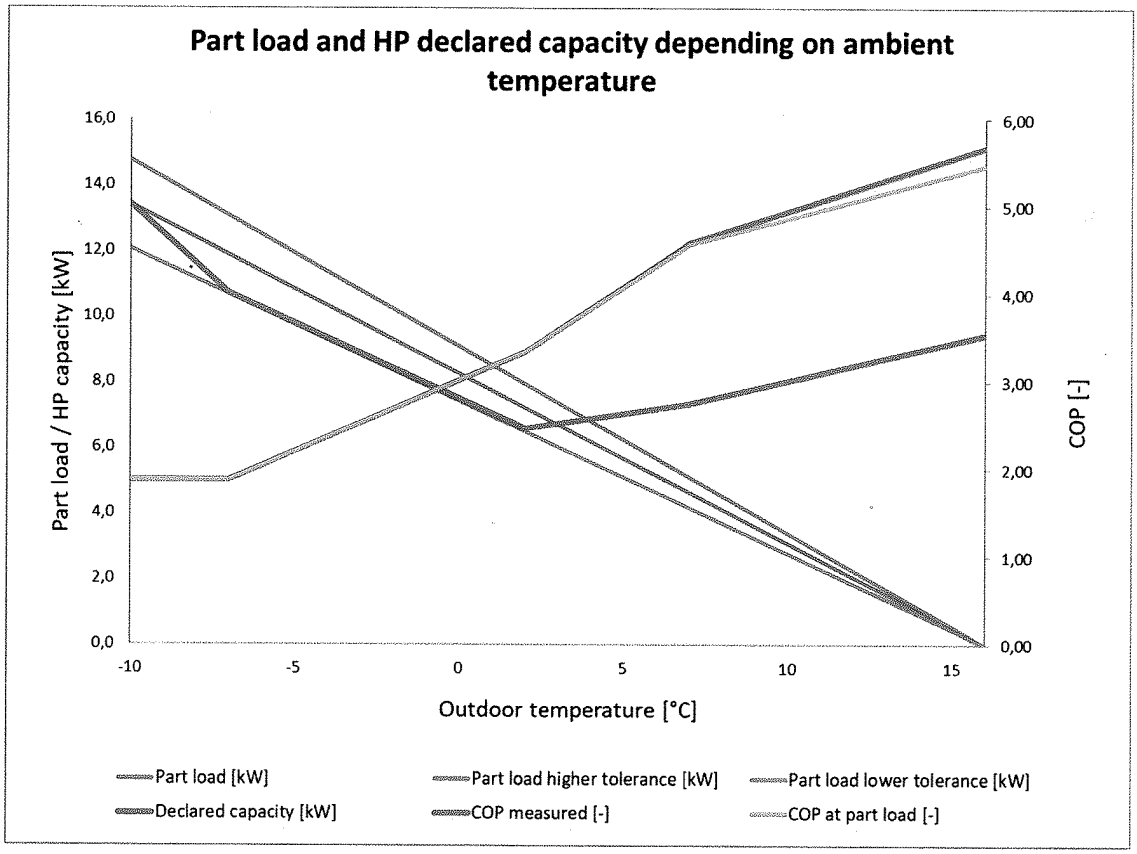
Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$

- 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]
	21	-10	1	100.00	13.40	13.40	13.40	0.00	0.00	1.88	13	7	13	7
	22	-9	25	96.15	12.89	12.51	12.51	0.00	0.00	1.88	322	171	322	171
	23	-8	23	92.31	12.37	11.61	11.61	0.00	0.00	1.88	285	152	285	152
A	**24**	**-7**	**24**	**88.46**	**11.86**	**10.72**	**10.72**	**0.00**	**0.00**	**1.88**	**285**	**152**	**285**	**152**
	25	-6	27	84.62	11.34	10.26	10.26	0.00	0.00	2.04	306	150	306	150
	26	-5	68	80.77	10.82	9.80	9.80	0.00	0.00	2.20	736	334	736	334
	27	-4	91	76.92	10.31	9.34	9.34	0.00	0.00	2.37	938	397	938	397
	28	-3	89	73.08	9.79	8.88	8.88	0.00	0.00	2.53	872	345	872	345
	29	-2	165	69.23	9.28	8.42	8.42	0.00	0.00	2.69	1531	569	1531	569
	30	-1	173	65.38	8.76	7.96	7.96	0.00	0.00	2.85	1516	531	1516	531
	31	0	240	61.54	8.25	7.50	7.50	0.00	0.00	3.02	1979	657	1979	657
	32	1	280	57.69	7.73	7.04	7.04	0.00	0.00	3.18	2165	681	2165	681
B	**33**	**2**	**320**	**53.85**	**7.22**	**6.58**	**6.58**	**0.00**	**0.00**	**3.34**	**2309**	**691**	**2309**	**691**
	34	3	357	50.00	6.70	6.73	6.70	0.00	0.00	3.59	2392	667	2392	667
	35	4	356	46.15	6.19	6.88	6.19	0.00	0.00	3.83	2202	575	2202	575
	36	5	303	42.31	5.67	7.03	5.67	0.00	0.00	4.08	1718	421	1718	421
	37	6	330	38.46	5.15	7.18	5.15	0.00	0.00	4.33	1701	393	1701	393
C	**38**	**7**	**326**	**34.62**	**4.64**	**7.33**	**4.64**	**0.00**	**0.00**	**4.57**	**1512**	**331**	**1512**	**331**
	39	8	348	30.77	4.12	7.56	4.12	0.00	0.00	4.67	1435	307	1435	307
	40	9	335	26.92	3.61	7.79	3.61	0.00	0.00	4.77	1209	253	1209	253
	41	10	315	23.08	3.09	8.03	3.09	0.00	0.00	4.87	974	200	974	200
	42	11	215	19.23	2.58	8.26	2.58	0.00	0.00	4.97	554	111	554	111
D	**43**	**12**	**169**	**15.38**	**2.06**	**8.50**	**2.06**	**0.00**	**0.00**	**5.07**	**348**	**69**	**348**	**69**
	44	13	151	11.54	1.55	8.73	1.55	0.00	0.00	5.17	234	45	234	45
	45	14	105	7.69	1.03	8.96	1.03	0.00	0.00	5.27	108	21	108	21
	46	15	74	3.85	0.52	9.20	0.52	0.00	0.00	5.37	38	7	38	7
		Σ	4910							Σ	27683	8238	27683	8238

SCOPon	3.36	SCOPnet	3.36
		SCOP	**3.36**

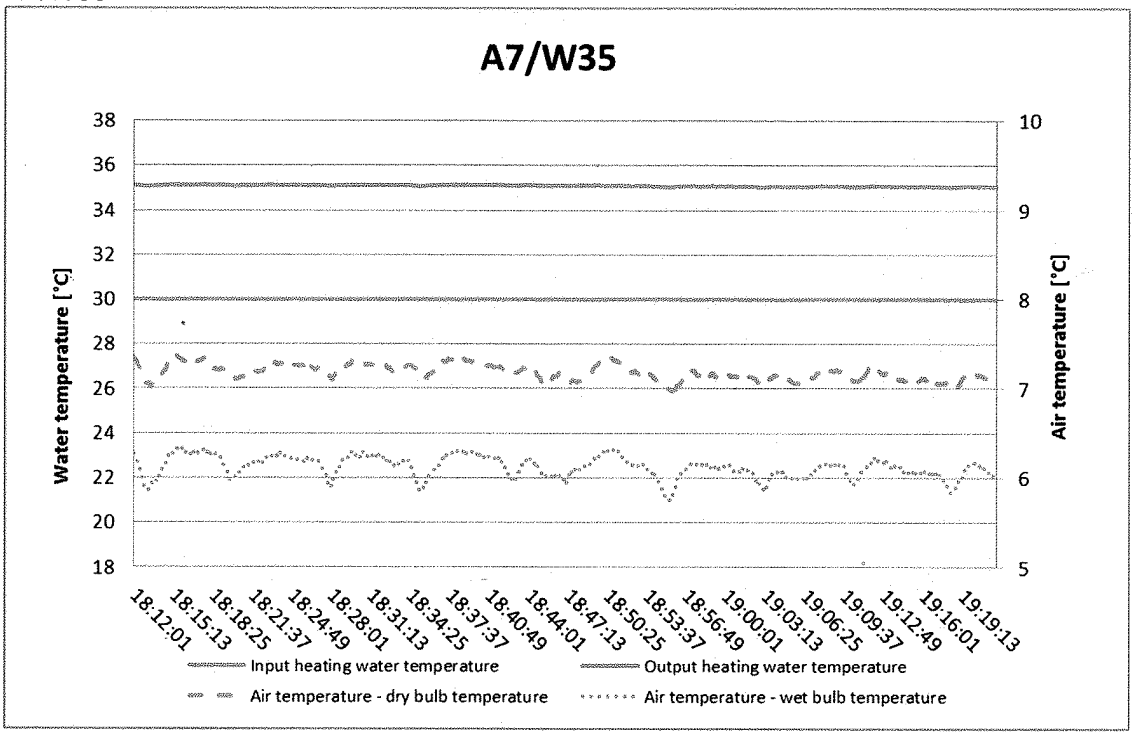
Part load performance diagram
- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „A" – average

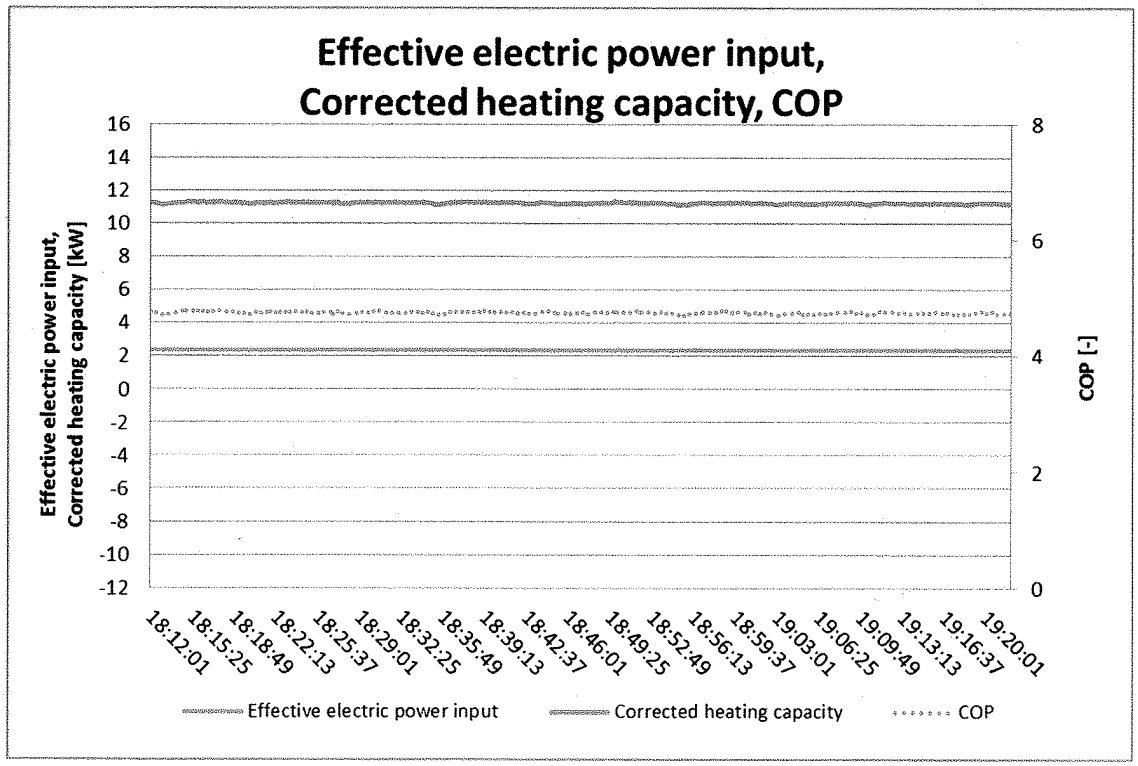


Tested by:	Ing. Alexandr Jordanov	Date:	2024-02-20	Signed:	
Reviewed and approved by:	Ing. Dominik Šedivý, Ph.D.	Date:	2024-02-20	Signed:	

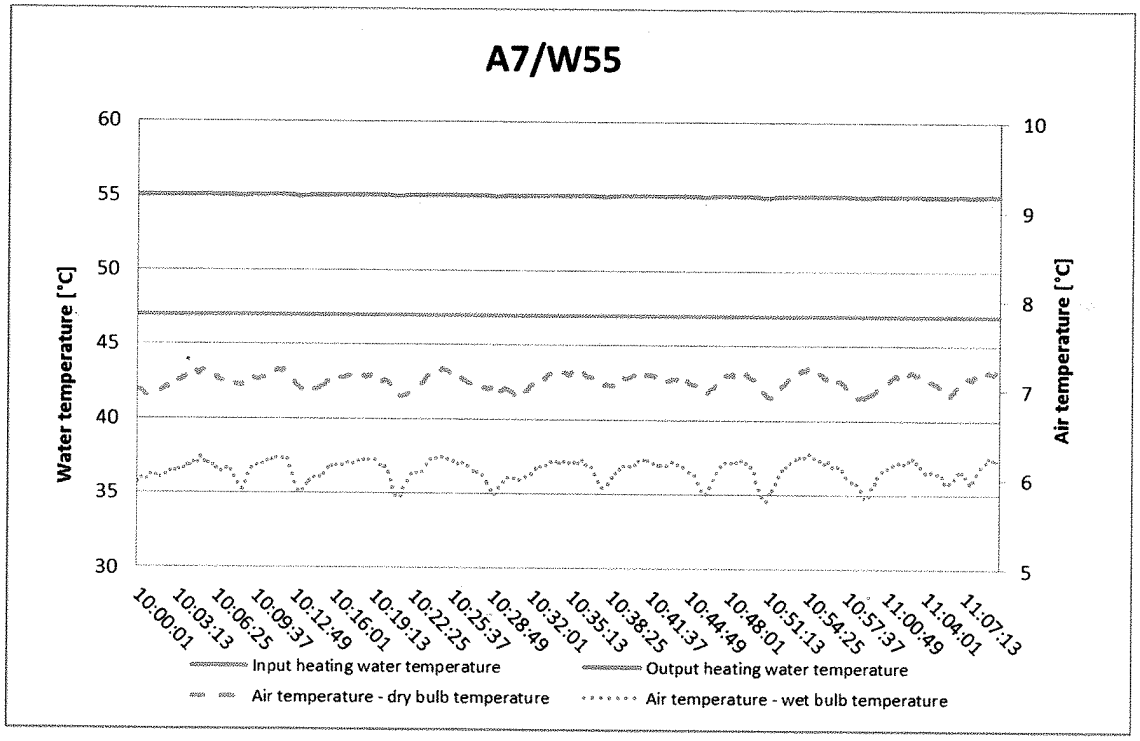
V. Graphs

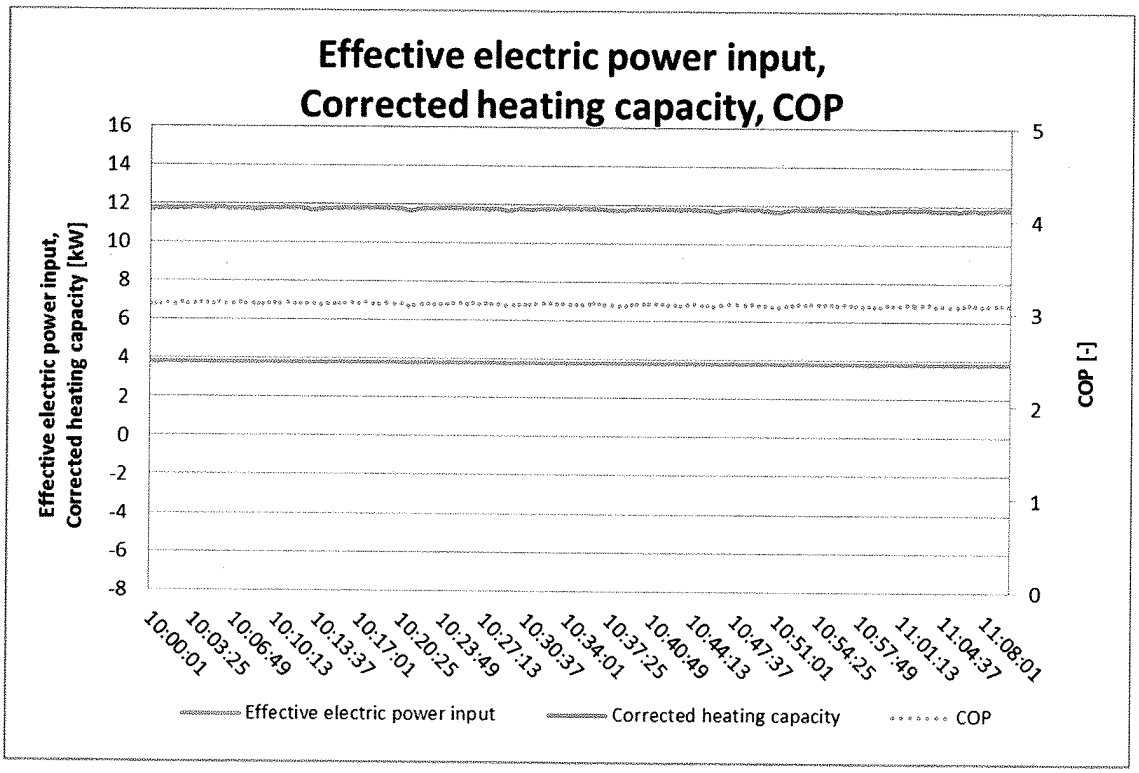
A7/W35



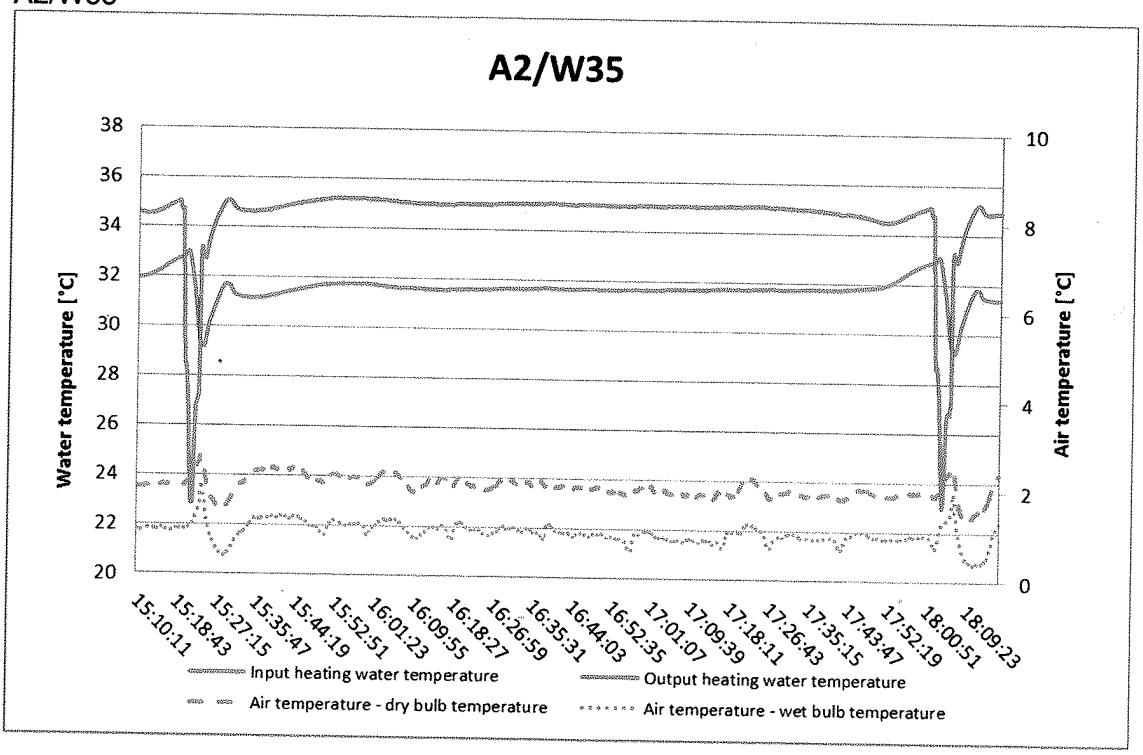


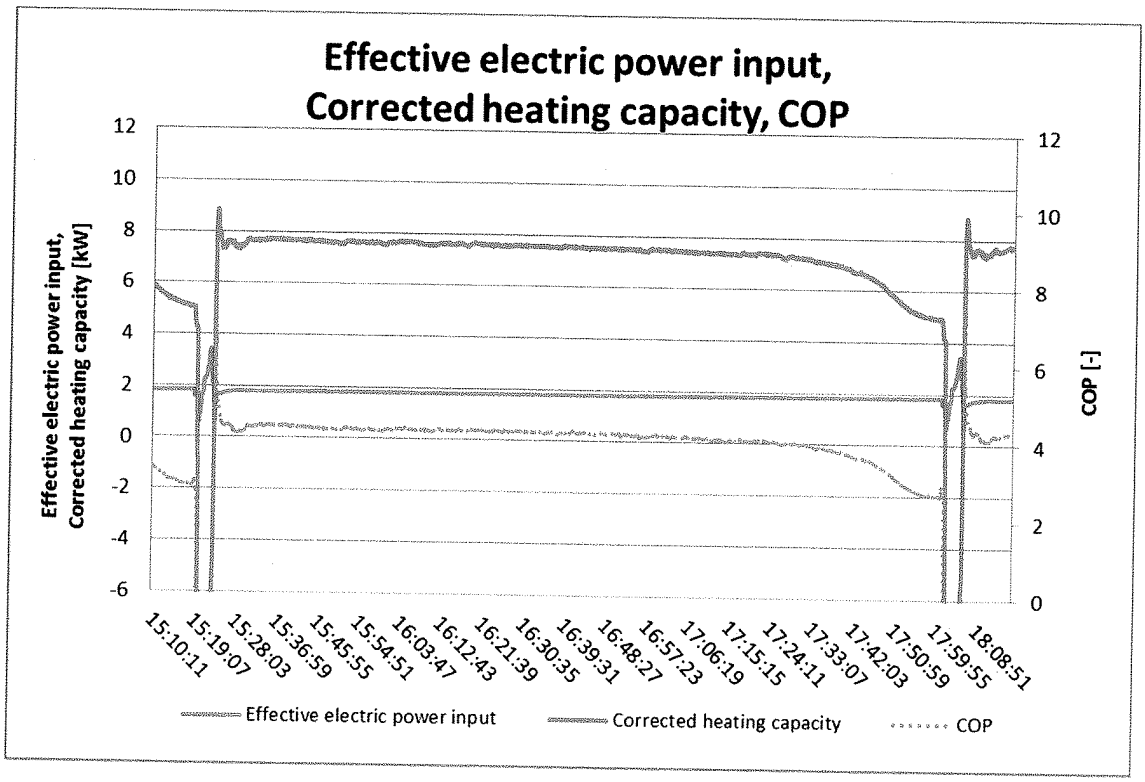
A7/W55


A7/W55
Water temperature [°C]
Air temperature [°C]
60
55
50
45
40
35
30
10
9
8
7
6
5
10:00:01
10:03:13
10:06:25
10:09:37
10:12:49
10:16:01
10:19:13
10:22:25
10:25:37
10:28:49
10:32:01
10:35:13
10:38:25
10:41:37
10:44:49
10:48:01
10:51:13
10:54:25
10:57:37
11:00:49
11:04:01
11:07:13
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

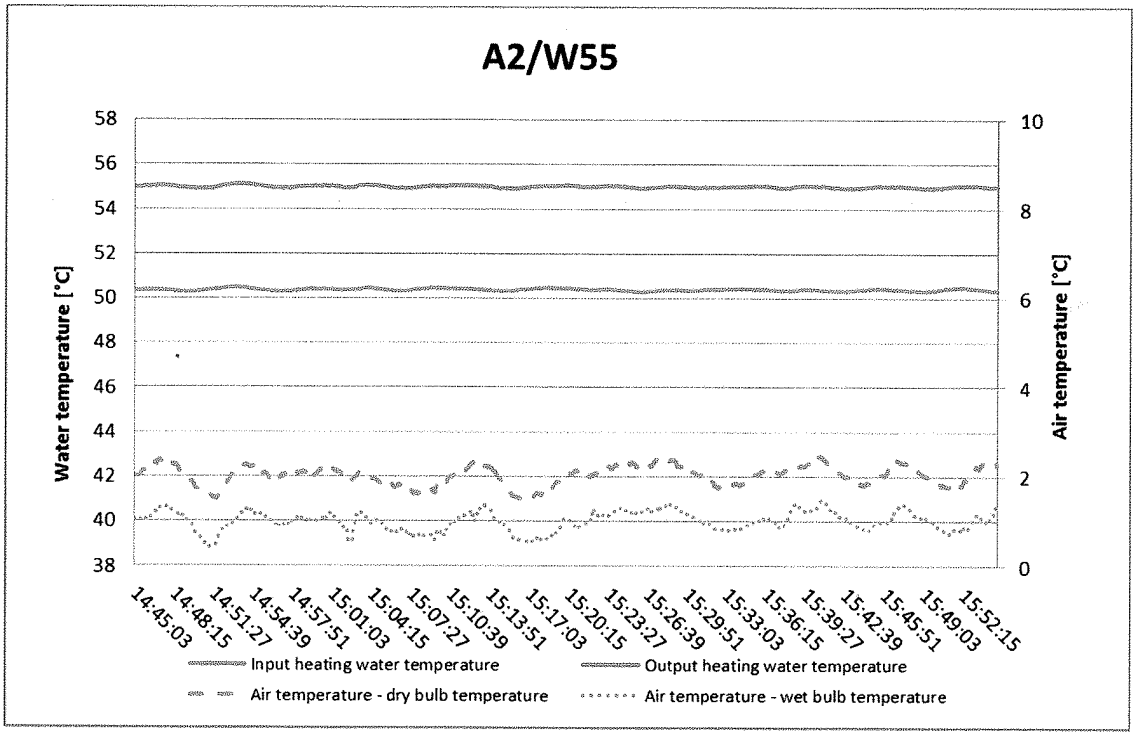

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
5
4
3
2
1
0
10:00:01
10:03:25
10:06:49
10:10:13
10:13:37
10:17:01
10:20:25
10:23:49
10:27:13
10:30:37
10:34:01
10:37:25
10:40:49
10:44:13
10:47:37
10:51:01
10:54:25
10:57:49
11:01:13
11:04:37
11:08:01
Effective electric power input
Corrected heating capacity
COP

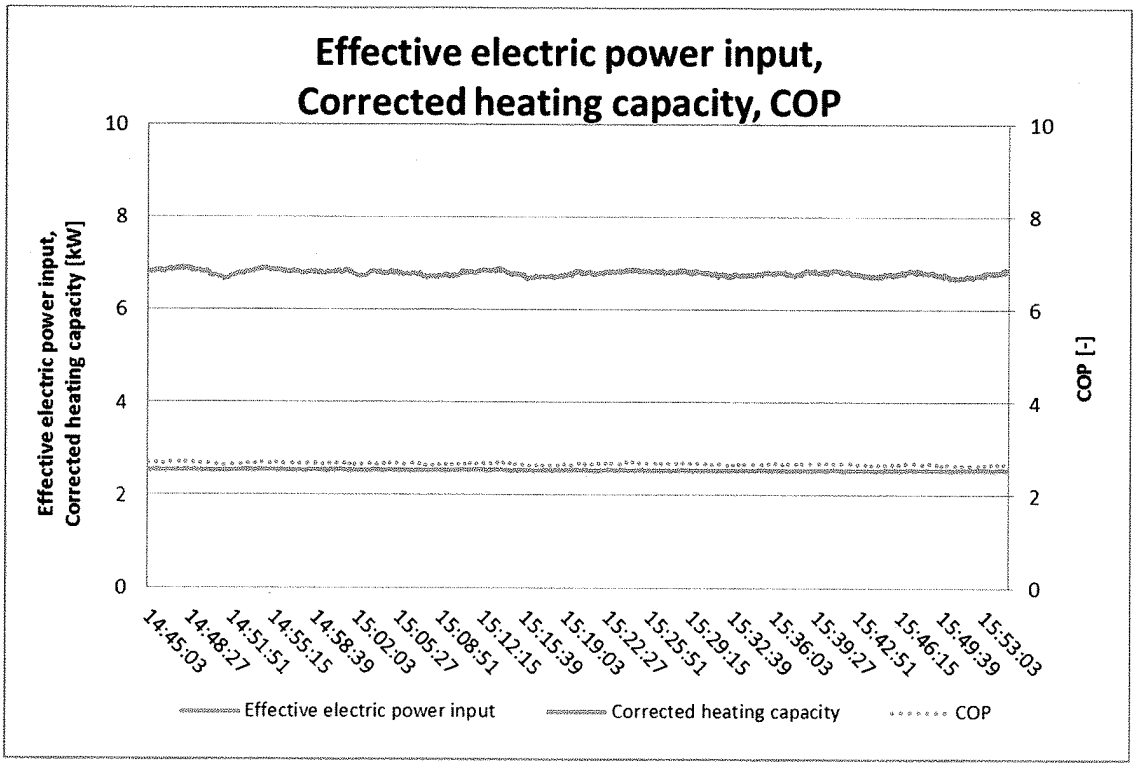
A2/W35


A2/W35
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
26
24
22
20
10
8
6
4
2
0
15:10:11
15:18:43
15:27:15
15:35:47
15:44:19
15:52:51
16:01:23
16:09:55
16:18:27
16:26:59
16:35:31
16:44:03
16:52:35
17:01:07
17:09:39
17:18:11
17:26:43
17:35:15
17:43:47
17:52:19
18:00:51
18:09:23
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

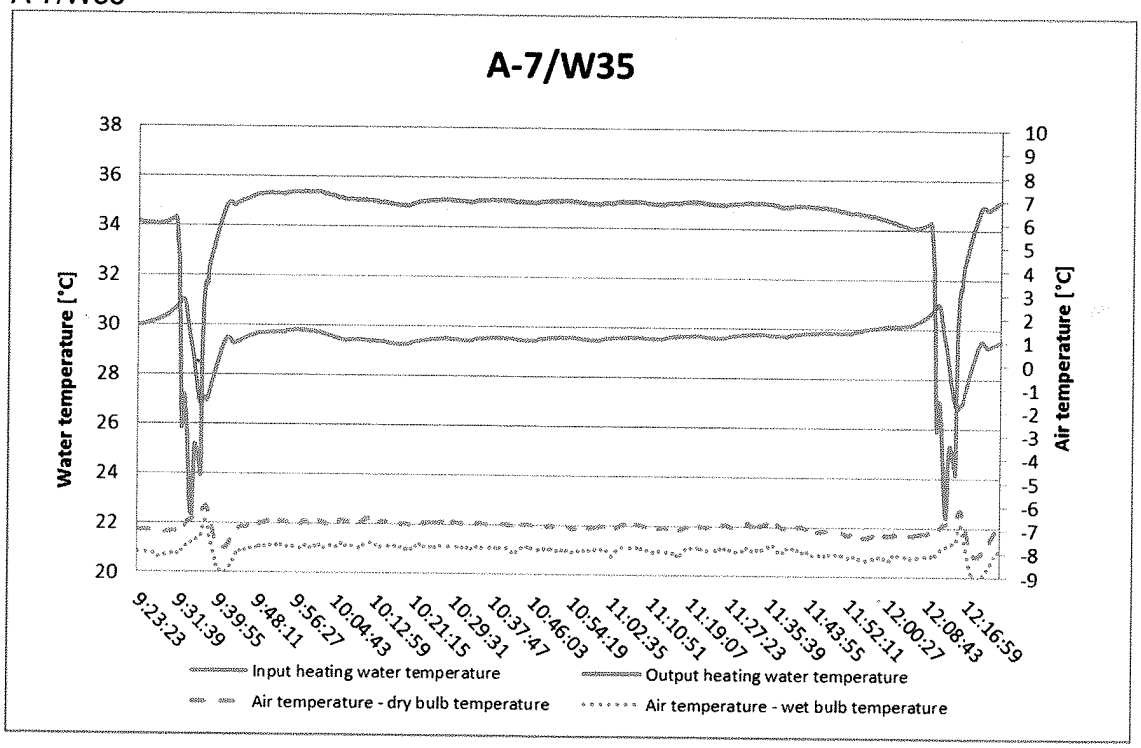

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
12
10
8
6
4
2
0
-2
-4
-6
15:10:11
15:19:07
15:28:03
15:36:59
15:45:55
15:54:51
16:03:47
16:12:43
16:21:39
16:30:35
16:39:31
16:48:27
16:57:23
17:06:19
17:15:15
17:24:11
17:33:07
17:42:03
17:50:59
17:59:55
18:08:51
Effective electric power input
Corrected heating capacity
COP

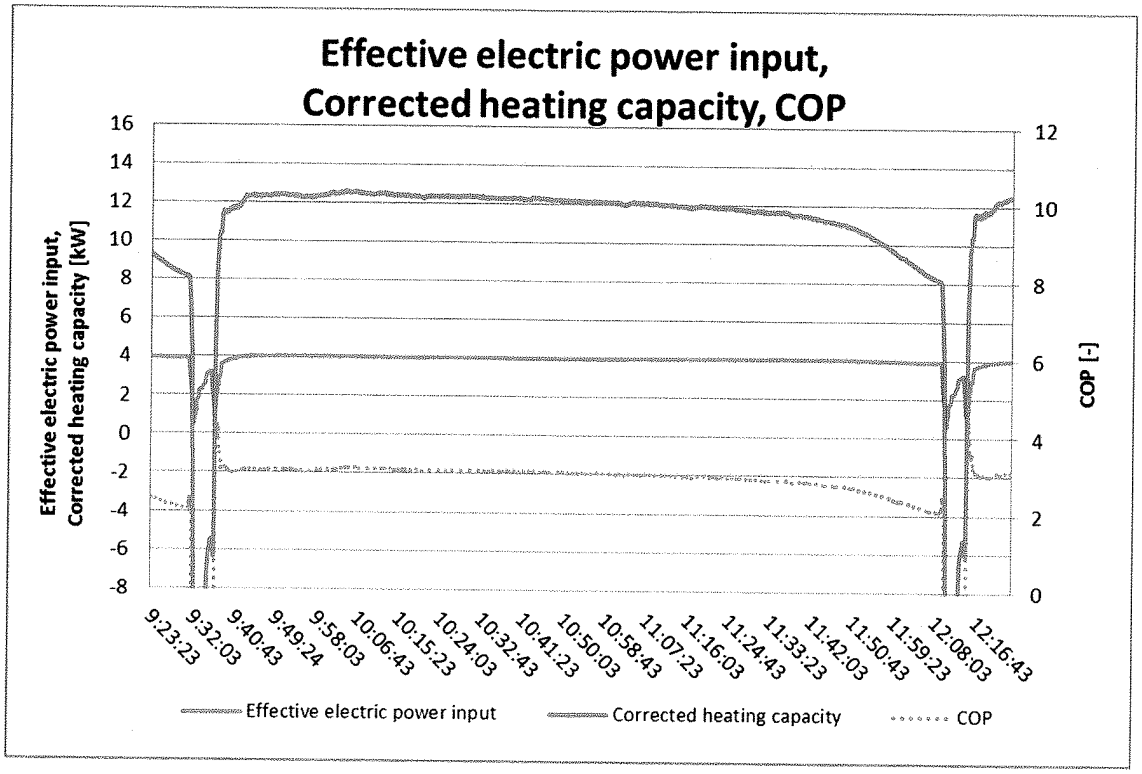
A2/W55


A2/W55
Water temperature [°C]
Air temperature [°C]
58
56
54
52
50
48
46
44
42
40
38
10
8
6
4
2
0
14:45:03
14:48:15
14:51:27
14:54:39
14:57:51
15:01:03
15:04:15
15:07:27
15:10:39
15:13:51
15:17:03
15:20:15
15:23:27
15:26:39
15:29:51
15:33:03
15:36:15
15:39:27
15:42:39
15:45:51
15:49:03
15:52:15
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

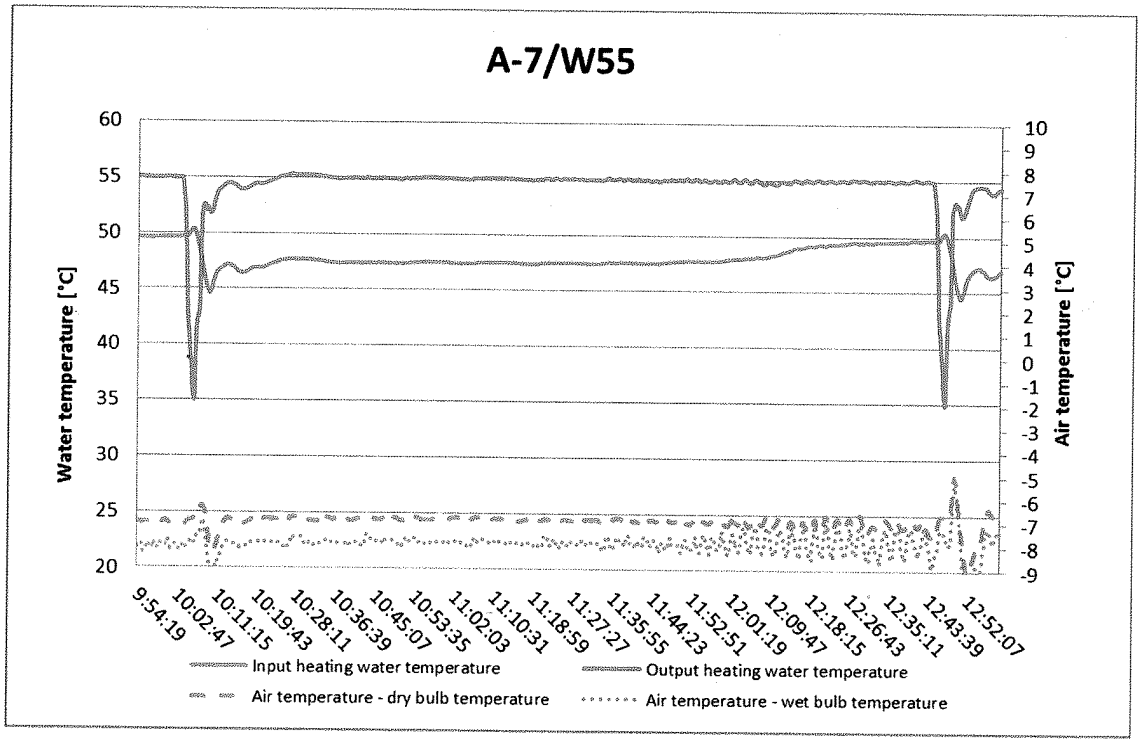

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
10
8
6
4
2
0
14:45:03
14:48:27
14:51:51
14:55:15
14:58:39
15:02:03
15:05:27
15:08:51
15:12:15
15:15:39
15:19:03
15:22:27
15:25:51
15:29:15
15:32:39
15:36:03
15:39:27
15:42:51
15:46:15
15:49:39
15:53:03
Effective electric power input
Corrected heating capacity
COP

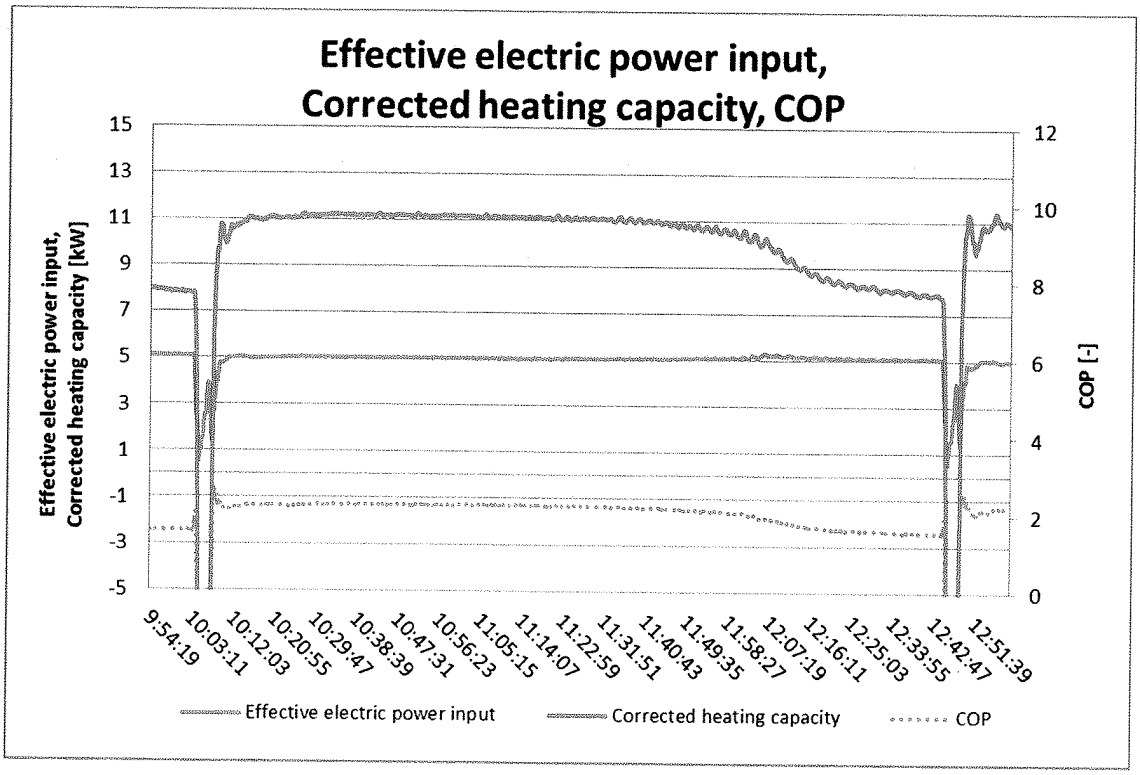
A-7/W35


A-7/W35
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
26
24
22
20
10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
9:23:23
9:31:39
9:39:55
9:48:11
9:56:27
10:04:43
10:12:59
10:21:15
10:29:31
10:37:47
10:46:03
10:54:19
11:02:35
11:10:51
11:19:07
11:27:23
11:35:39
11:43:55
11:52:11
12:00:27
12:08:43
12:16:59
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

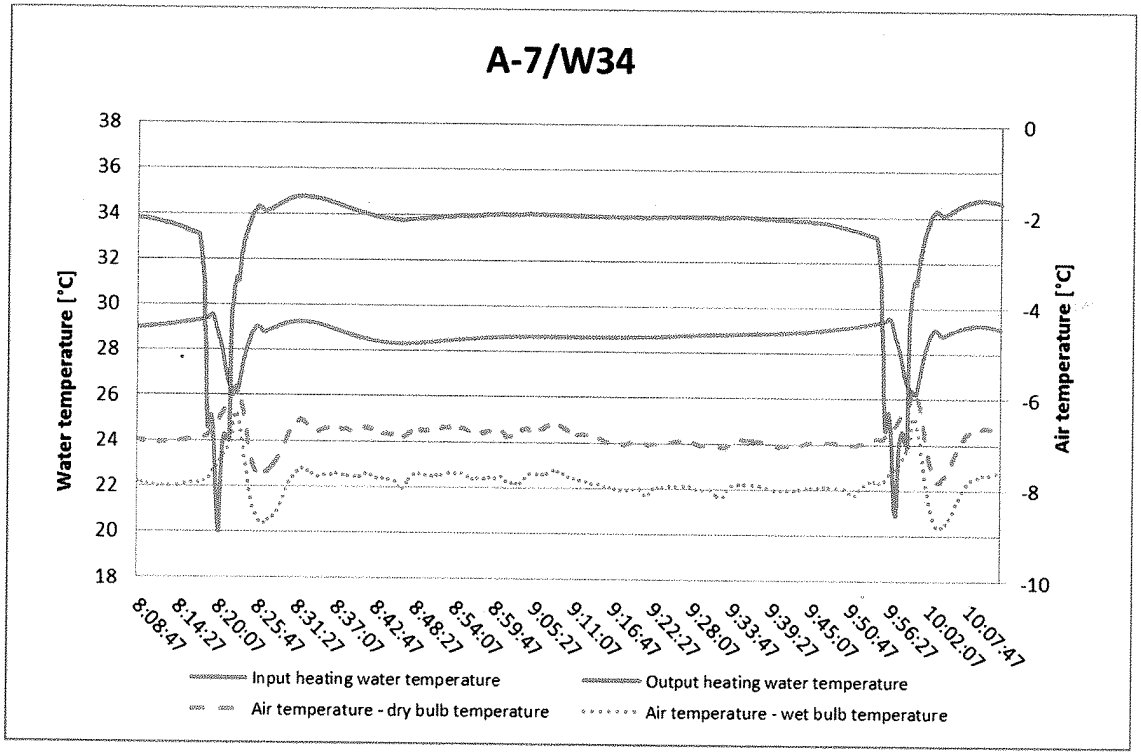

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
12
10
8
6
4
2
0
9:23:23
9:32:03
9:40:43
9:49:24
9:58:03
10:06:43
10:15:23
10:24:03
10:32:43
10:41:23
10:50:03
10:58:43
11:07:23
11:16:03
11:24:43
11:33:23
11:42:03
11:50:43
11:59:23
12:08:03
12:16:43
Effective electric power input
Corrected heating capacity
COP

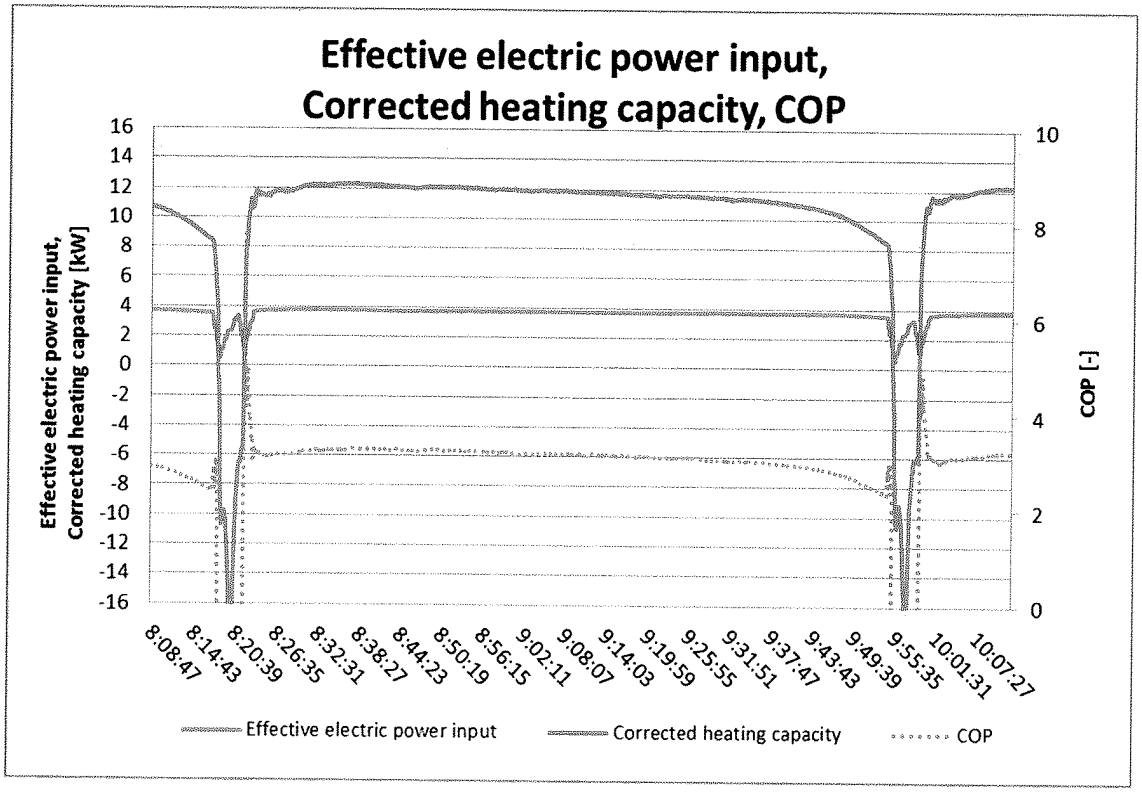
A-7/W55


A-7/W55
Water temperature [°C]
Air temperature [°C]
60
55
50
45
40
35
30
25
20
10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
9:54:19
10:02:47
10:11:15
10:19:43
10:28:11
10:36:39
10:45:07
10:53:35
11:02:03
11:10:31
11:18:59
11:27:27
11:35:55
11:44:23
11:52:51
12:01:19
12:09:47
12:18:15
12:26:43
12:35:11
12:43:39
12:52:07
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

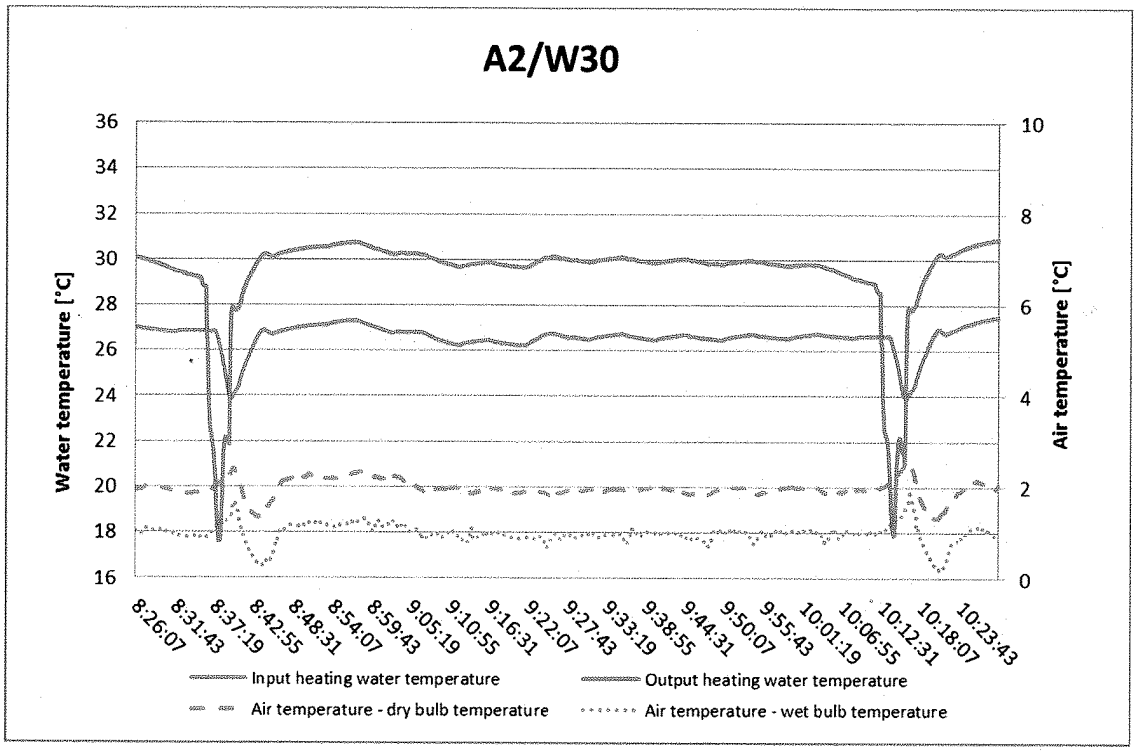

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
15
13
11
9
7
5
3
1
-1
-3
-5
12
10
8
6
4
2
0
9:54:19
10:03:11
10:12:03
10:20:55
10:29:47
10:38:39
10:47:31
10:56:23
11:05:15
11:14:07
11:22:59
11:31:51
11:40:43
11:49:35
11:58:27
12:07:19
12:16:11
12:25:03
12:33:55
12:42:47
12:51:39
Effective electric power input
Corrected heating capacity
COP

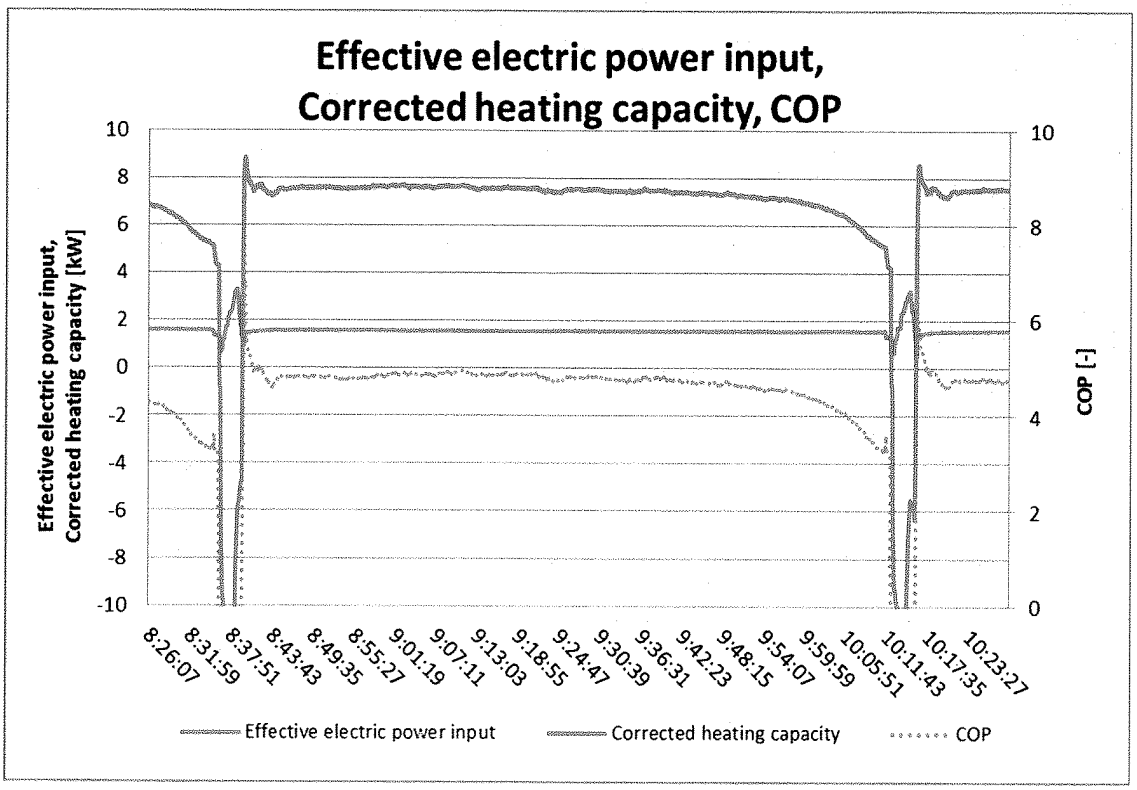
A-7/W34


A-7/W34
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
26
24
22
20
18
0
-2
-4
-6
-8
-10
8:08:47
8:14:27
8:20:07
8:25:47
8:31:27
8:37:07
8:42:47
8:48:27
8:54:07
8:59:47
9:05:27
9:11:07
9:16:47
9:22:27
9:28:07
9:33:47
9:39:27
9:45:07
9:50:47
9:56:27
10:02:07
10:07:47
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

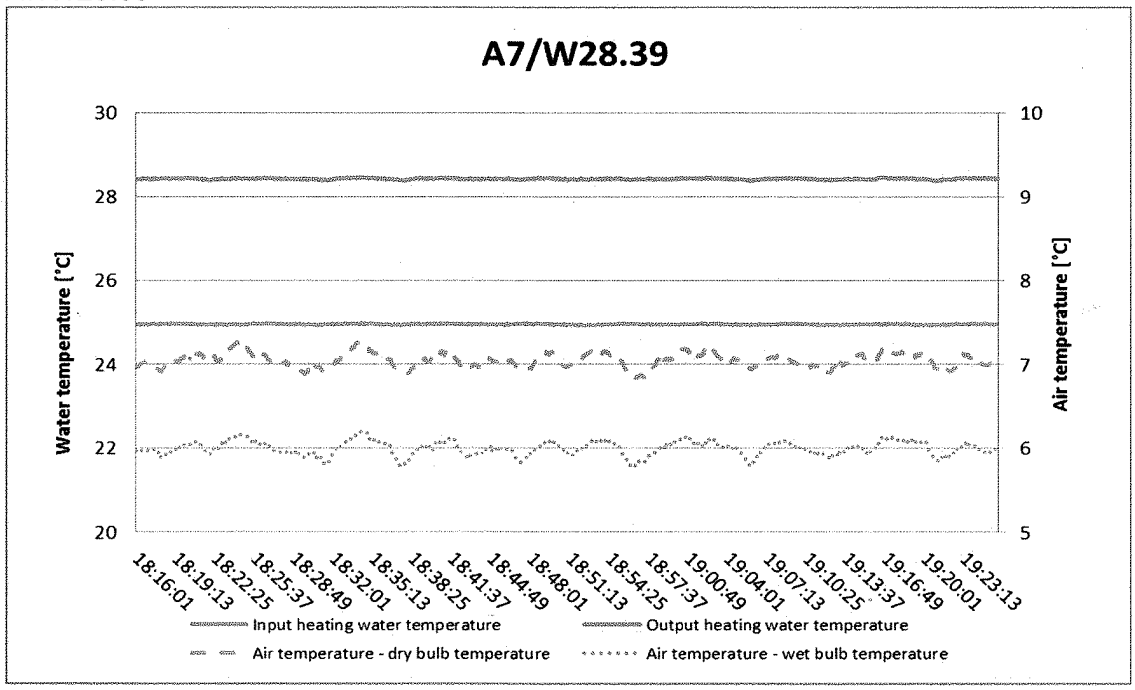

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
10
8
6
4
2
0
8:08:47
8:14:43
8:20:39
8:26:35
8:32:31
8:38:27
8:44:23
8:50:19
8:56:15
9:02:11
9:08:07
9:14:03
9:19:59
9:25:55
9:31:51
9:37:47
9:43:43
9:49:39
9:55:35
10:01:31
10:07:27
Effective electric power input
Corrected heating capacity
COP

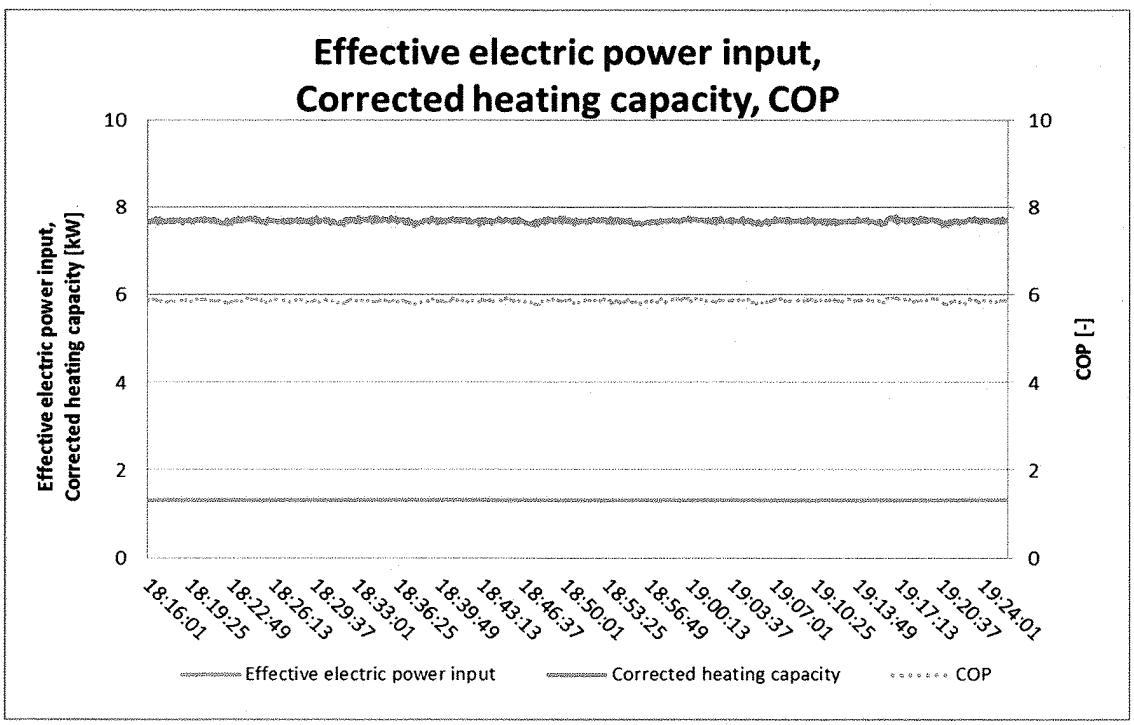
A2/W30


A2/W30
Water temperature [°C]
Air temperature [°C]
36
34
32
30
28
26
24
22
20
18
16
10
8
6
4
2
0
8:26:07
8:31:43
8:37:19
8:42:55
8:48:31
8:54:07
8:59:43
9:05:19
9:10:55
9:16:31
9:22:07
9:27:43
9:33:19
9:38:55
9:44:31
9:50:07
9:55:43
10:01:19
10:06:55
10:12:31
10:18:07
10:23:43
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

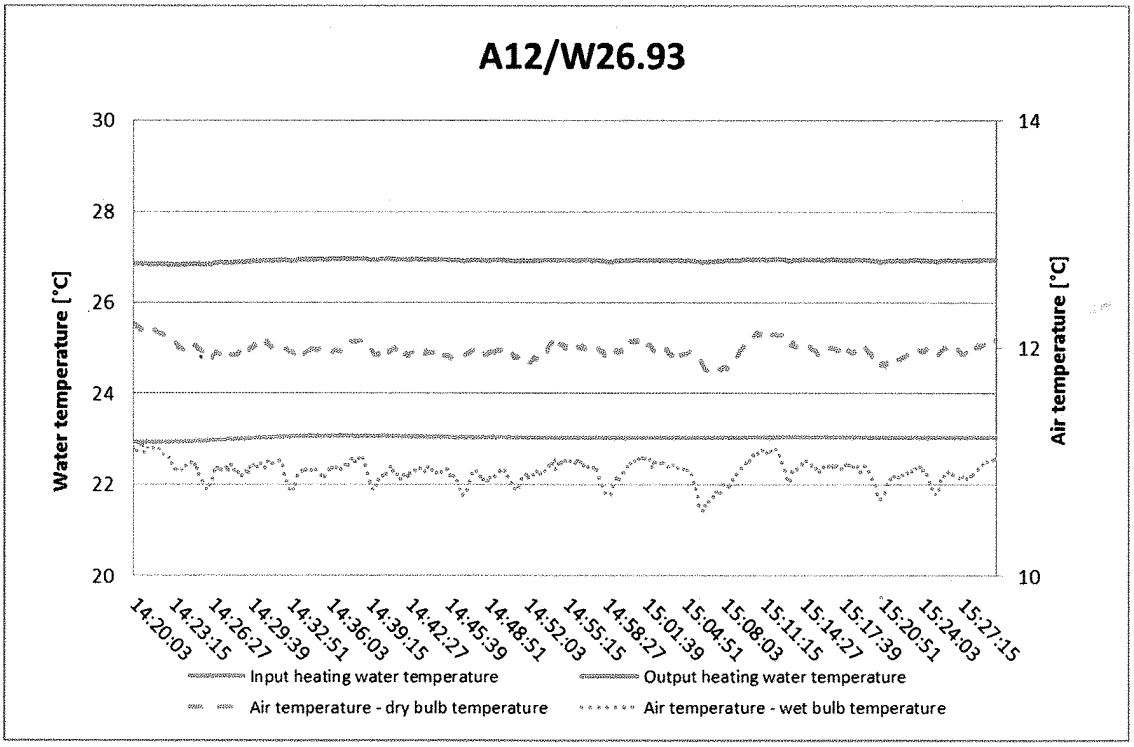

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
10
8
6
4
2
0
-2
-4
-6
-8
-10
8:26:07
8:31:59
8:37:51
8:43:43
8:49:35
8:55:27
9:01:19
9:07:11
9:13:03
9:18:55
9:24:47
9:30:39
9:36:31
9:42:23
9:48:15
9:54:07
9:59:59
10:05:51
10:11:43
10:17:35
10:23:27
Effective electric power input
Corrected heating capacity
COP

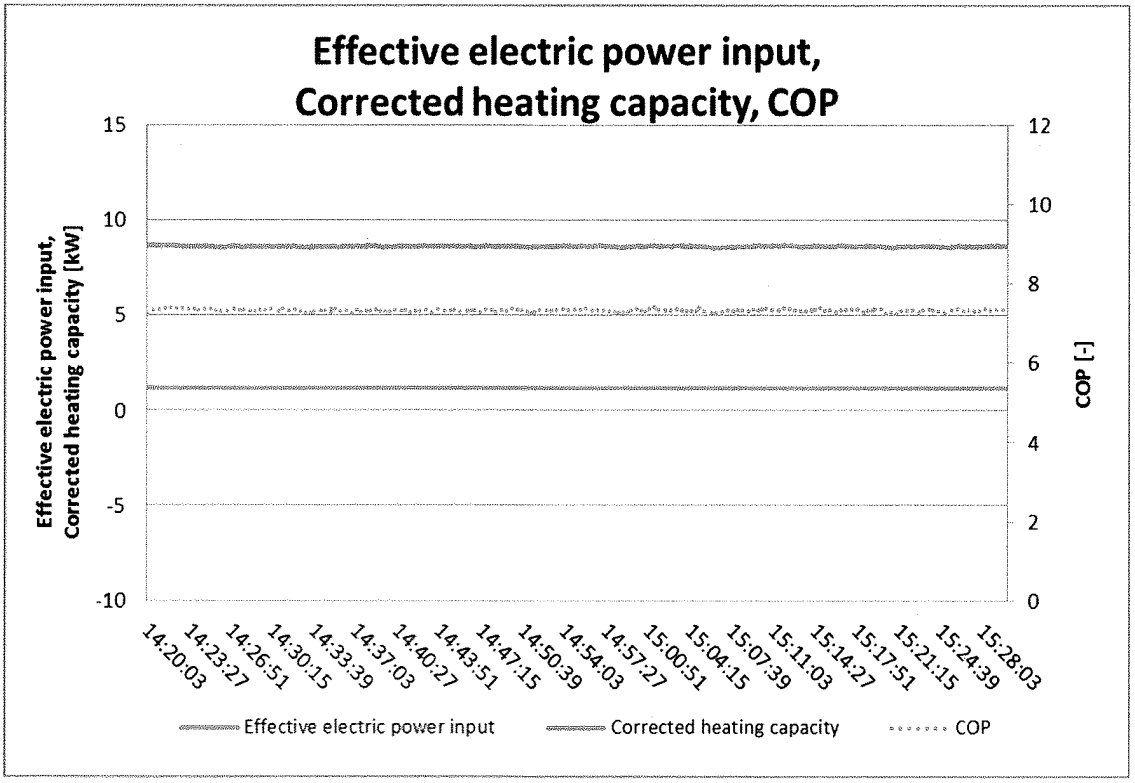
A7/W28.39


A7/W28.39
Water temperature [°C]
Air temperature [°C]
30
28
26
24
22
20
10
9
8
7
6
5
18:16:01
18:19:13
18:22:25
18:25:37
18:28:49
18:32:01
18:35:13
18:38:25
18:41:37
18:44:49
18:48:01
18:51:13
18:54:25
18:57:37
19:00:49
19:04:01
19:07:13
19:10:25
19:13:37
19:16:49
19:20:01
19:23:13
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

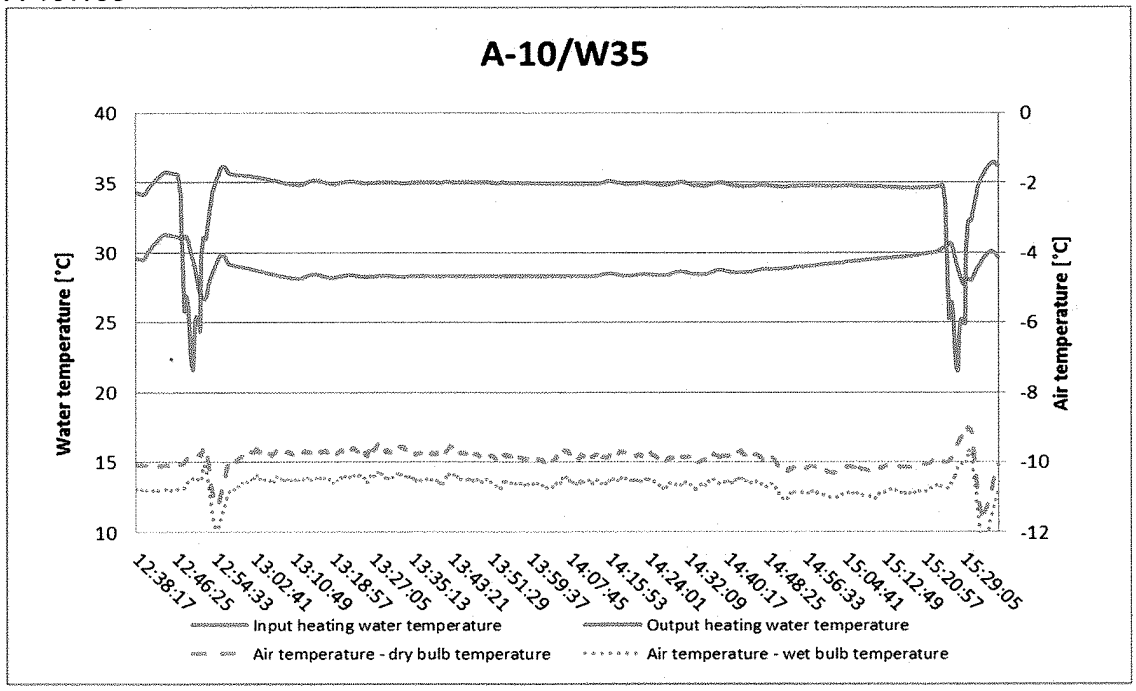

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
10
8
6
4
2
0
18:16:01
18:19:25
18:22:49
18:26:13
18:29:37
18:33:01
18:36:25
18:39:49
18:43:13
18:46:37
18:50:01
18:53:25
18:56:49
19:00:13
19:03:37
19:07:01
19:10:25
19:13:49
19:17:13
19:20:37
19:24:01
Effective electric power input
Corrected heating capacity
COP

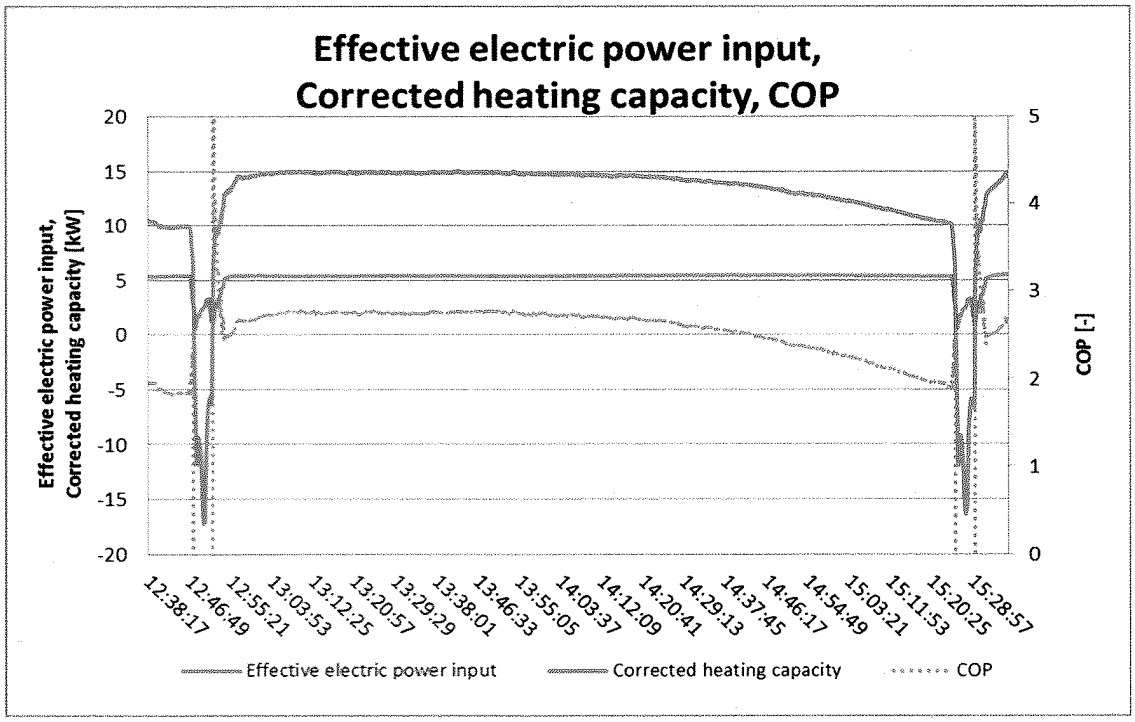
A12/W26.93


A12/W26.93
Water temperature [°C]
Air temperature [°C]
30
28
26
24
22
20
14
12
10
14:20:03
14:23:15
14:26:27
14:29:39
14:32:51
14:36:03
14:39:15
14:42:27
14:45:39
14:48:51
14:52:03
14:55:15
14:58:27
15:01:39
15:04:51
15:08:03
15:11:15
15:14:27
15:17:39
15:20:51
15:24:03
15:27:15
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

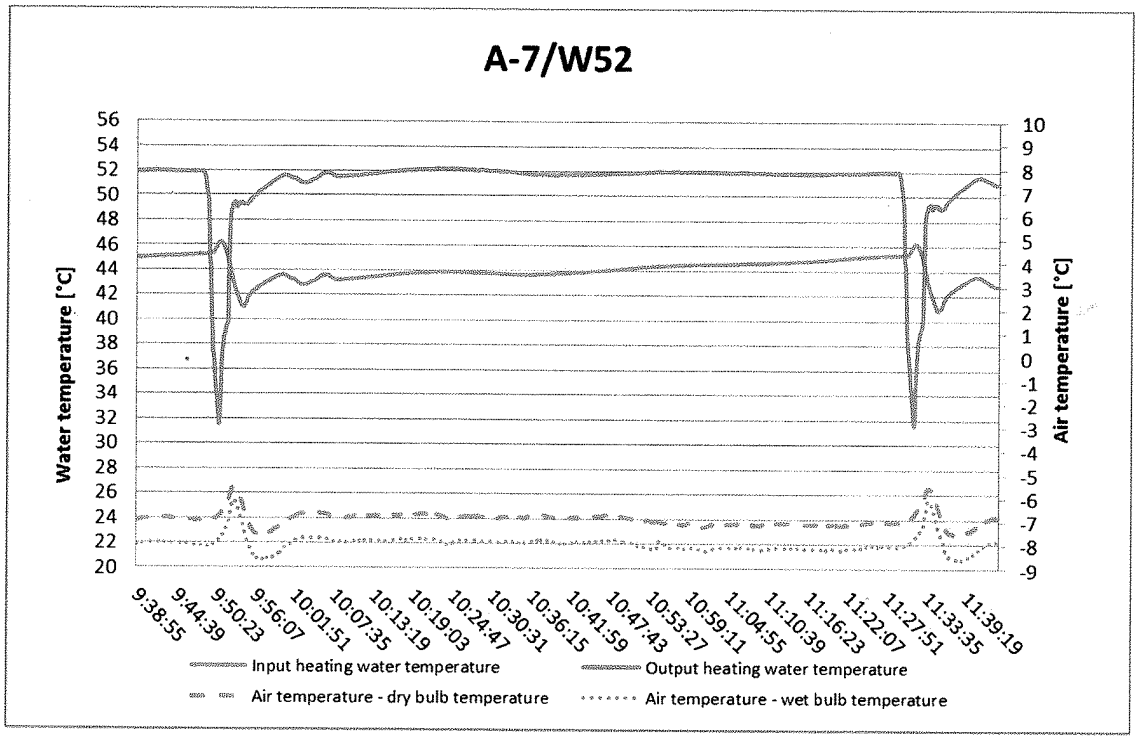

Effective electric power input, Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
15
10
5
0
-5
-10
12
10
8
6
4
2
0
14:20:03
14:23:27
14:26:51
14:30:15
14:33:39
14:37:03
14:40:27
14:43:51
14:47:15
14:50:39
14:54:03
14:57:27
15:00:51
15:04:15
15:07:39
15:11:03
15:14:27
15:17:51
15:21:15
15:24:39
15:28:03
Effective electric power input
Corrected heating capacity
COP

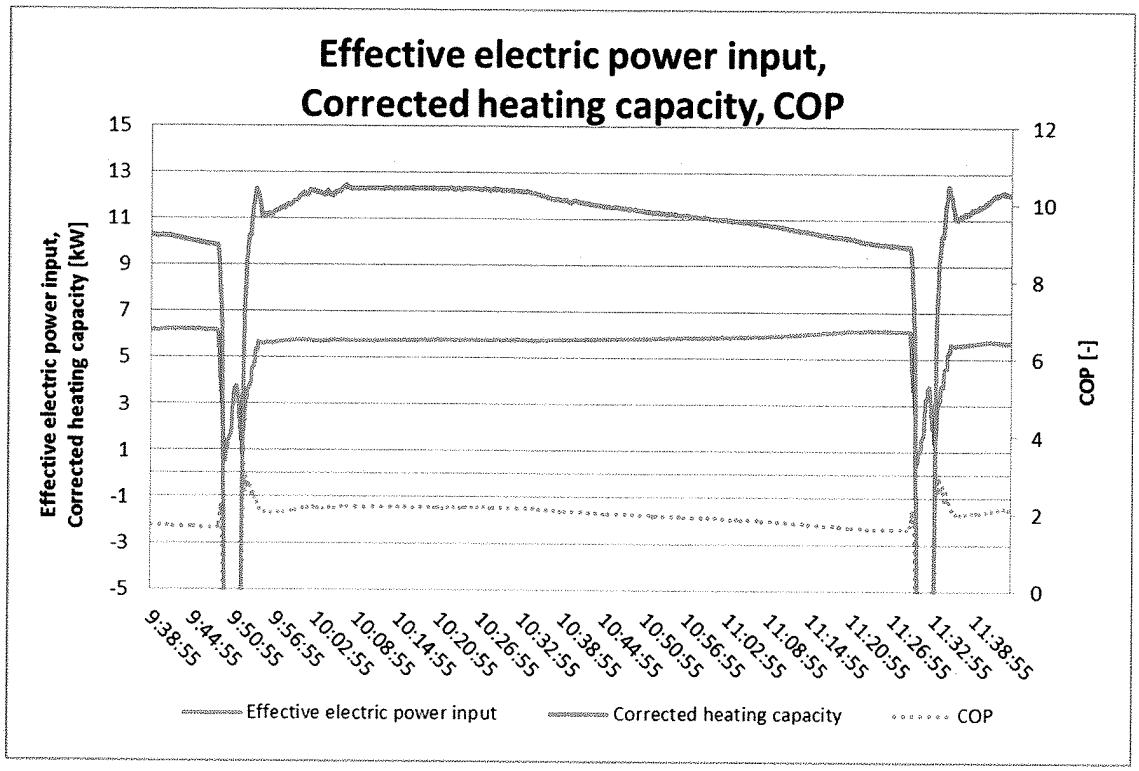
A-10W35


A-10/W35
Water temperature [°C]
Air temperature [°C]
40
35
30
25
20
15
10
0
-2
-4
-6
-8
-10
-12
12:38:17
12:46:25
12:54:33
13:02:41
13:10:49
13:18:57
13:27:05
13:35:13
13:43:21
13:51:29
13:59:37
14:07:45
14:15:53
14:24:01
14:32:09
14:40:17
14:48:25
14:56:33
15:04:41
15:12:49
15:20:57
15:29:05
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

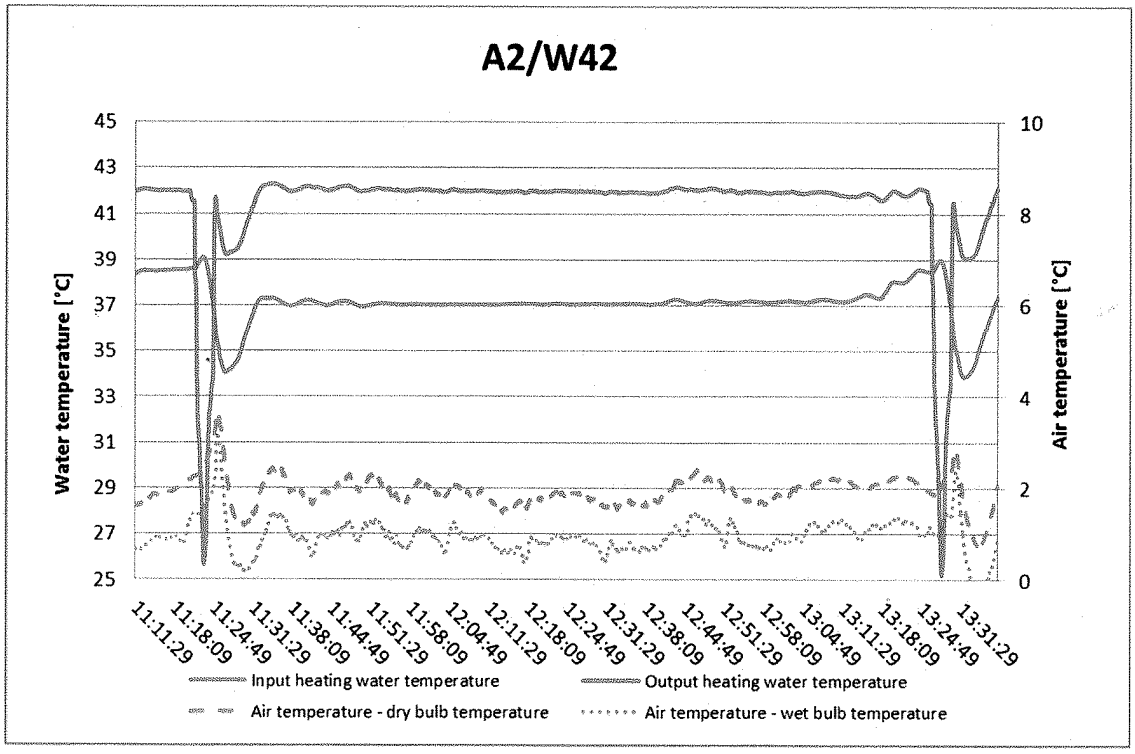

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
20
15
10
5
0
-5
-10
-15
-20
5
4
3
2
1
0
12:38:17
12:46:49
12:55:21
13:03:53
13:12:25
13:20:57
13:29:29
13:38:01
13:46:33
13:55:05
14:03:37
14:12:09
14:20:41
14:29:13
14:37:45
14:46:17
14:54:49
15:03:21
15:11:53
15:20:25
15:28:57
Effective electric power input
Corrected heating capacity
COP

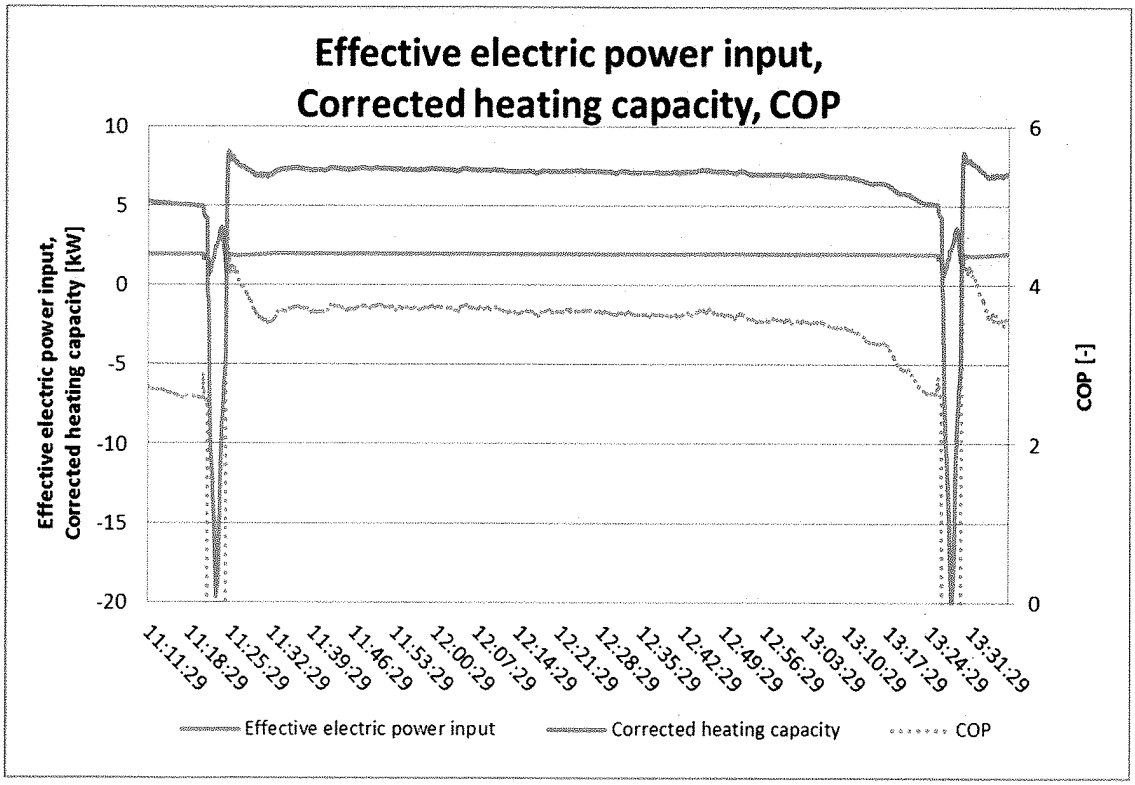
A-7/W52


A-7/W52
Water temperature [°C]
Air temperature [°C]
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

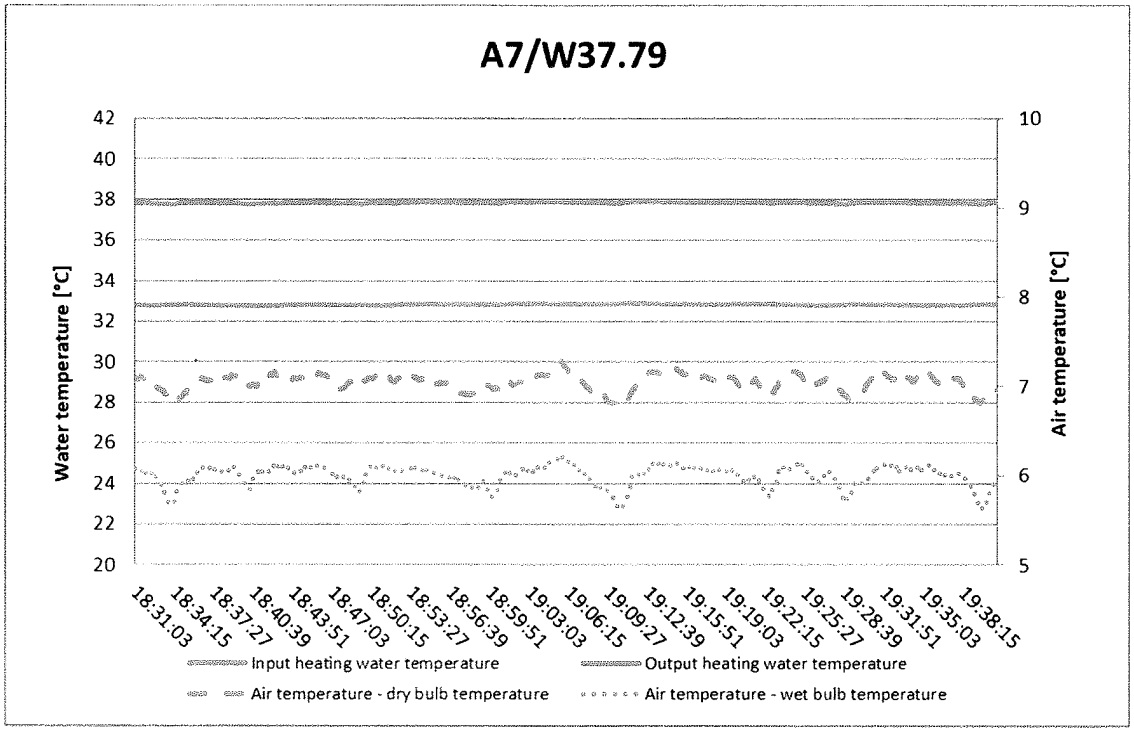

Effective electric power input, Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
Effective electric power input
Corrected heating capacity
COP

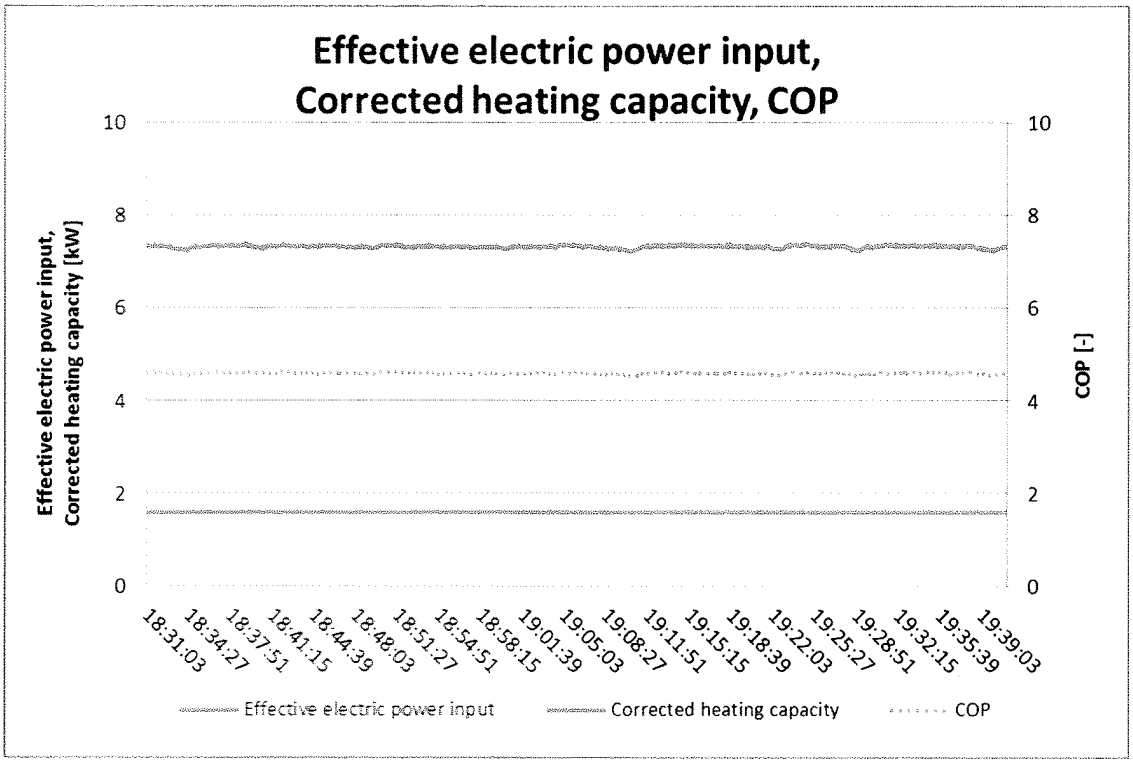
A2/W42


A2/W42
Water temperature [°C]
Air temperature [°C]
45
43
41
39
37
35
33
31
29
27
25
10
8
6
4
2
0
11:11:29
11:18:09
11:24:49
11:31:29
11:38:09
11:44:49
11:51:29
11:58:09
12:04:49
12:11:29
12:18:09
12:24:49
12:31:29
12:38:09
12:44:49
12:51:29
12:58:09
13:04:49
13:11:29
13:18:09
13:24:49
13:31:29
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

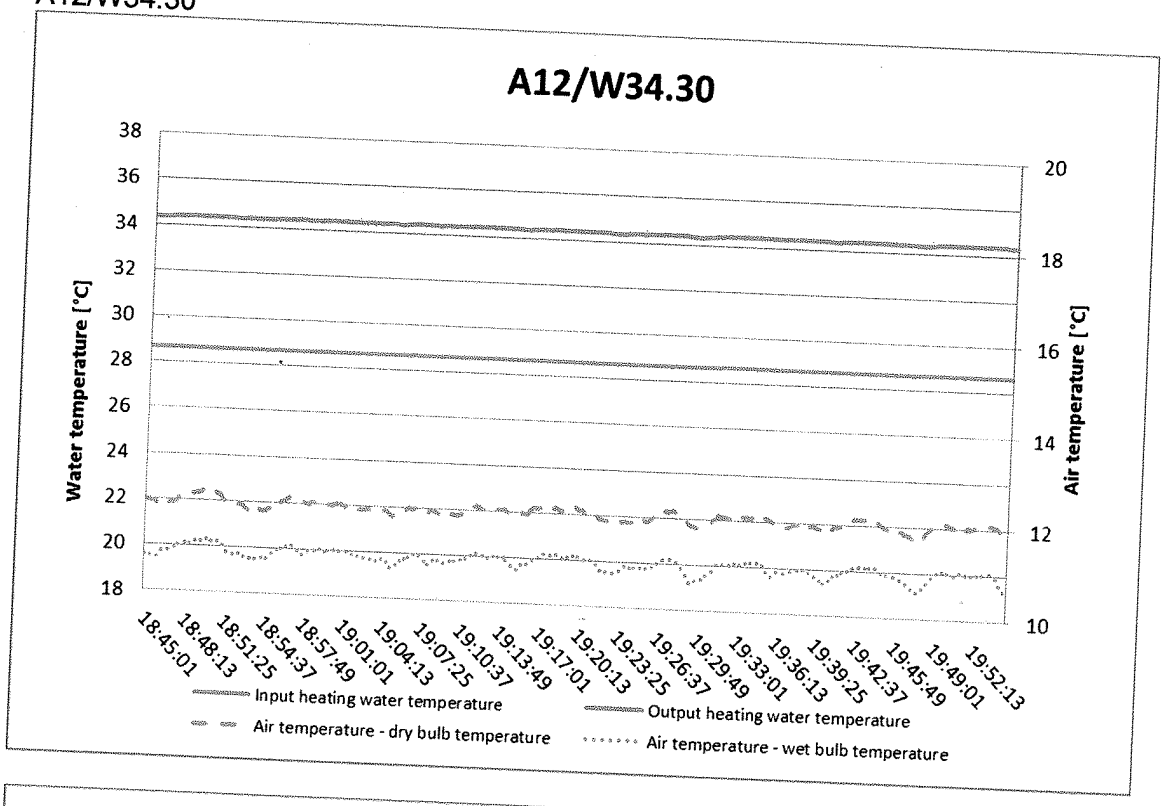

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
10
5
0
-5
-10
-15
-20
6
4
2
0
11:11:29
11:18:29
11:25:29
11:32:29
11:39:29
11:46:29
11:53:29
12:00:29
12:07:29
12:14:29
12:21:29
12:28:29
12:35:29
12:42:29
12:49:29
12:56:29
13:03:29
13:10:29
13:17:29
13:24:29
13:31:29
Effective electric power input
Corrected heating capacity
COP

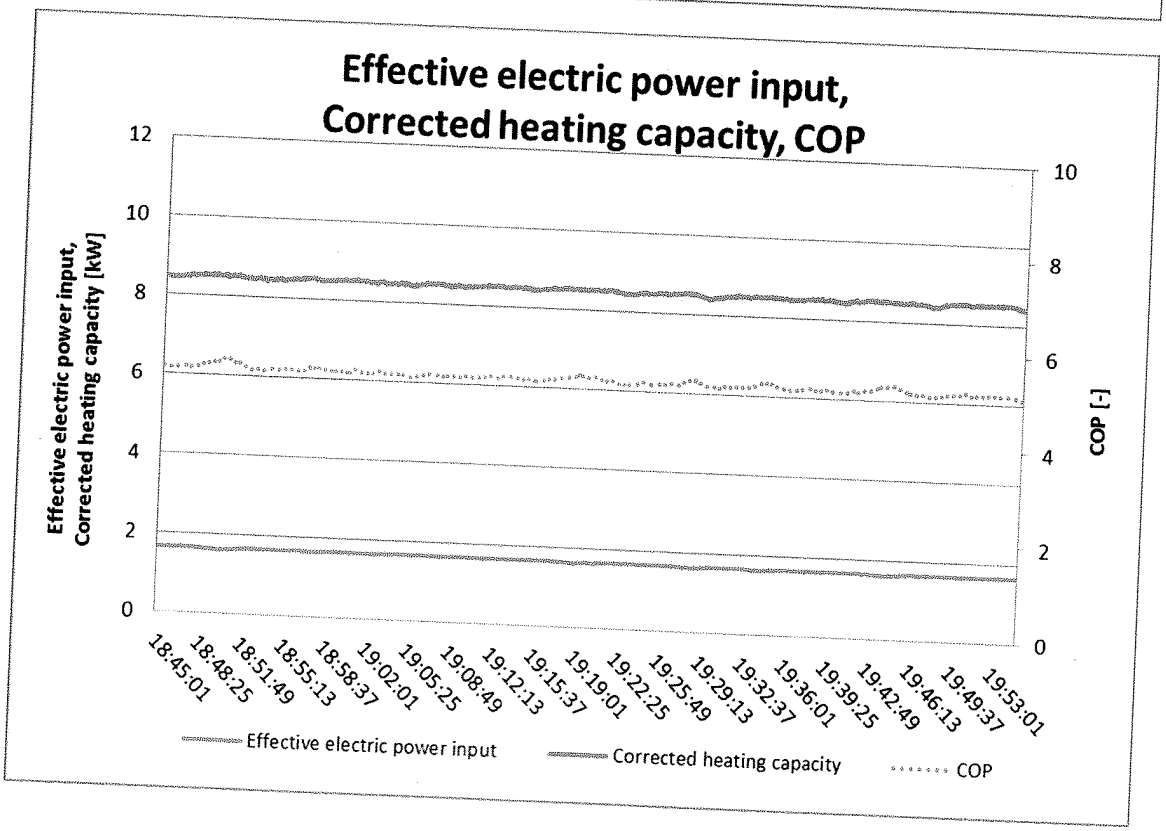
A7/W37.79


A7/W37.79
Water temperature [°C]
Air temperature [°C]
42
40
38
36
34
32
30
28
26
24
22
20
10
9
8
7
6
5
18:31:03
18:34:15
18:37:27
18:40:39
18:43:51
18:47:03
18:50:15
18:53:27
18:56:39
18:59:51
19:03:03
19:06:15
19:09:27
19:12:39
19:15:51
19:19:03
19:22:15
19:25:27
19:28:39
19:31:51
19:35:03
19:38:15
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

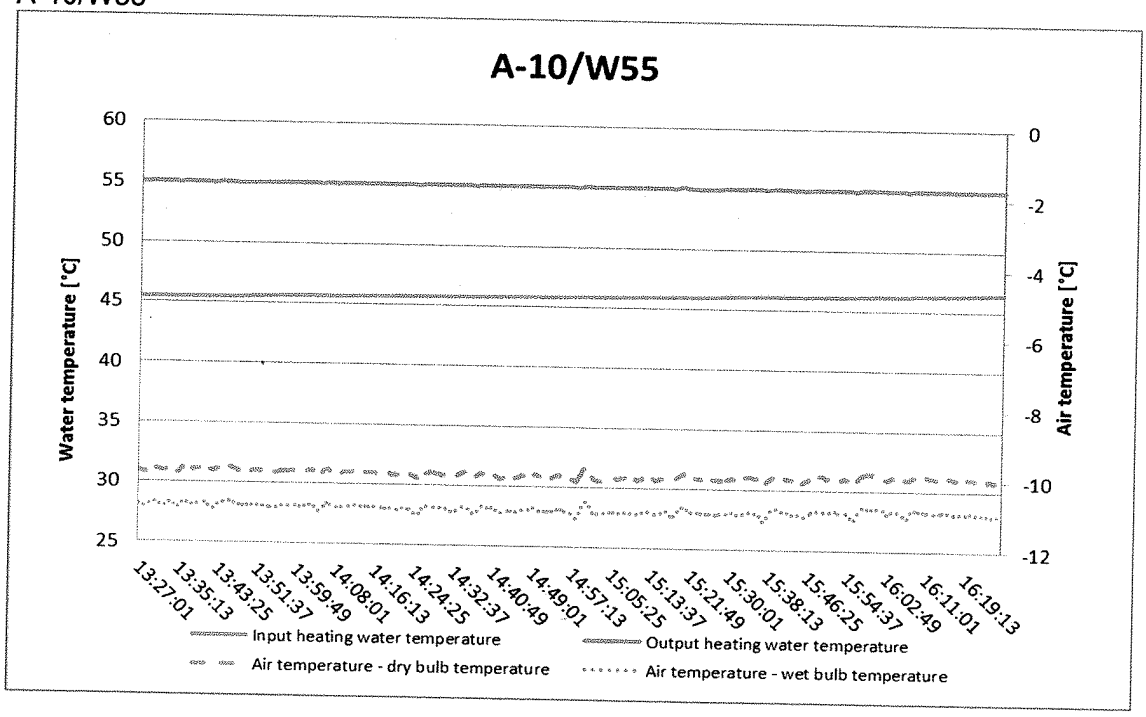

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
10
8
6
4
2
0
18:31:03
18:34:27
18:37:51
18:41:15
18:44:39
18:48:03
18:51:27
18:54:51
18:58:15
19:01:39
19:05:03
19:08:27
19:11:51
19:15:15
19:18:39
19:22:03
19:25:27
19:28:51
19:32:15
19:35:39
19:39:03
Effective electric power input
Corrected heating capacity
COP

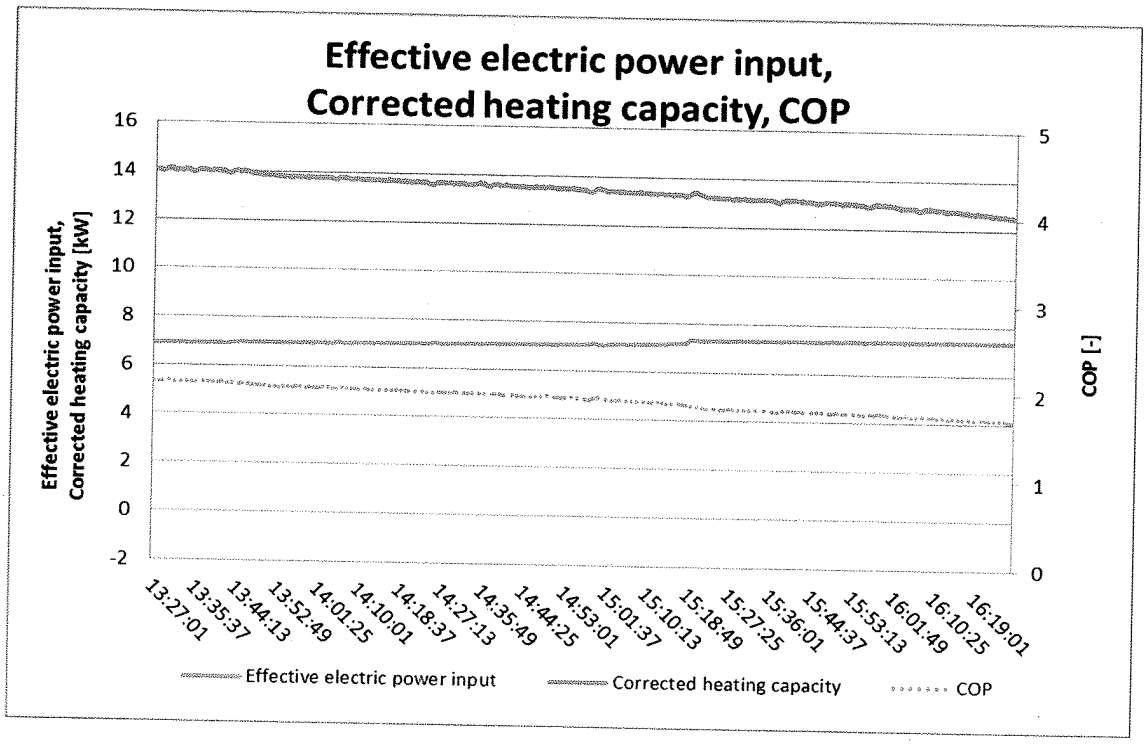
A12/W34.30


A12/W34.30
Water temperature [°C]
Air temperature [°C]
38
36
34
32
30
28
26
24
22
20
18
20
18
16
14
12
10
18:45:01
18:48:13
18:51:25
18:54:37
18:57:49
19:01:01
19:04:13
19:07:25
19:10:37
19:13:49
19:17:01
19:20:13
19:23:25
19:26:37
19:29:49
19:33:01
19:36:13
19:39:25
19:42:37
19:45:49
19:49:01
19:52:13
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
10
8
6
4
2
0
18:45:01
18:48:25
18:51:49
18:55:13
18:58:37
19:02:01
19:05:25
19:08:49
19:12:13
19:15:37
19:19:01
19:22:25
19:25:49
19:29:13
19:32:37
19:36:01
19:39:25
19:42:49
19:46:13
19:49:37
19:53:01
Effective electric power input
Corrected heating capacity
COP

A-10/W55


A-10/W55
Water temperature [°C]
Air temperature [°C]
60
55
50
45
40
35
30
25
0
-2
-4
-6
-8
-10
-12
13:27:01
13:35:13
13:43:25
13:51:37
13:59:49
14:08:01
14:16:13
14:24:25
14:32:37
14:40:49
14:49:01
14:57:13
15:05:25
15:13:37
15:21:49
15:30:01
15:38:13
15:46:25
15:54:37
16:02:49
16:11:01
16:19:13
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 [-]
16
14
12
10
8
6
4
2
0
-2
5
4
3
2
1
0
13:27:01
13:35:37
13:44:13
13:52:49
14:01:25
14:10:01
14:18:37
14:27:13
14:35:49
14:44:25
14:53:01
15:01:37
15:10:13
15:18:49
15:27:25
15:36:01
15:44:37
15:53:13
16:01:49
16:10:25
16:19:01
Effective electric power input
Corrected heating capacity
COP

VI. A list of referenced documents

- Order of 2023-12-14 (Order reg. no. B-81026, received on 2023-12-14)
- Contract B-81026/39
- 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 14511-3:2023 - 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

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Test Report approved by: Ing. Mario Jankola
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– End of Test Report –