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

CERTYFIKAT Z BADAŃ
TEST CERTIFICATE

Number **O-B-00261-25**

Klient *Customer*	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Produkt *Product*	Pompa Ciepła powietrze/woda – monoblok *Air/water heat pump –monobloc*
Rodzaj oznaczenie / znak towarowy *Type designation / Trade mark*	**MultiTherma 12 HD** **MultiTherma 12 HD + ElectroBox** **MultiTherma 12 HD + MultiTherma BASIC 5-15** **MultiTherma 12 HD + MultiTherma PRO 5-15** **MultiTherma 12 HD Cascade** **MultiTherma 12 HD Cascade + ElectroBox** **MultiTherma 12 HD Cascade + MultiTherma BASIC 5-15** **MultiTherma 12 HD Cascade + MultiTherma PRO 5-15**
Metoda testowa *Test methods*	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, ČSN EN 14825:2023
Podstawy zaświadczenia *Basis of certificate*	Raport z badań - *Test reports*: 32-11057/2/T z dnia - *of* 2024-07-28 Dokumentacja techniczna przedstawiona przez - *Technical documents of* IGLOO Sp. z o.o
Teplotní aplikace *Temperature application*	**NISKOTEMPERATUROWA - *LOW*,** Referencyjna temperatura wody 35 °C - *Reference water temperature 35 °C*
Referencyjny okres grzewczy *Reference heating season*	**„A" = Umiarkowany - *„A" = average*** (Warunki obliczeniowe odniesienia dla ogrzewania – *Reference design conditions for heating* $T_{designh}$ = -10 °C)

Specyfikacja warunków - *Specification of conditions*:

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

Wyniki - *Results*:

Zastosowania w niskich temperaturach – *Low temperature application*

(Referencyjna temperatura wody 35 °C - *Reference water temperature 35 °C*)

Jednostka zewnętrzna – *Outdoor units*	MultiTherma 12 HD	MultiTherma 12 HD	MultiTherma 12 HD	MultiTherma 12 HD

Jednostka wewnętrzna – *Indoor units*		–	ElectroBox	MultiTherma BASIC 5-15	MultiTherma PRO 5-15
		(Badana / Tested)	(Nie badana / Not tested)	(Nie badana / *Not tested*)	(Nie badana / *Not tested*)
Obciążenie obliczeniowe dla trybu ogrzewania *Full load heating*	$P_{designh}$ [kW]	8.22	8.22	8.22	8.22
Temperatura dwuwalencyjna *Bivalent temperature*	$T_{bivalent}$ [°C]	-10	-10	-10	-10
Wskaźnik sezonowej efektywności *Seasonal coefficient of performance*	SCOP [–]	4.83	4.83	4.66	4.53
Sezonowa efektywność energetyczna ogrzewania pomieszcze *Seasonal Space heating energy efficiency*	η_s [%]	190	190	184	178

Jednostka zewnętrzna – *Outdoor units*		MultiTherma 12 HD Cascade	MultiTherma 12 HD Cascade	MultiTherma 12 HD Cascade	MultiTherma 12 HD Cascade
Jednostka wewnętrzna – *Indoor units*		–	ElectroBox	MultiTherma BASIC 5-15	MultiTherma PRO 5-15
		(Nie badana / Not tested)	(Nie badana / Not tested)	(Nie badana / *Not tested*)	(Nie badana / *Not tested*)
Obciążenie obliczeniowe dla trybu ogrzewania *Full load heating*	$P_{designh}$ [kW]	8.22	8.22	8.22	8.22
Temperatura dwuwalencyjna *Bivalent temperature*	$T_{bivalent}$ [°C]	-10	-10	-10	-10
Wskaźnik sezonowej efektywności *Seasonal coefficient of performance*	SCOP [–]	4.83	4.83	4.66	4.53
Sezonowa efektywność energetyczna ogrzewania pomieszcze *Seasonal Space heating energy efficiency*	η_s [%]	190	190	184	178

(Badana - *Tested*) Tę próbkę analityczną/warunek zbadano w Laboratorium Badawczym. *This test sample was tested at the Testing Laboratory.*

(Nie badana - *Not tested*) Techniczne dane zostały zgłoszone przez Producenta zgodnie ze specyfikacją linii modeli i nie zostały zbadane przez Laboratorium Badawcze. *The technical data were declared by the Manufacturer according to the model range specifications and were not tested by the Testing Laboratory.*

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

Brno, 2025-02-13

Ing. Mario Jankola
Kierownik ds. Urządzeń Grzewczych i Wyrobów Budowlanych
Heating Equipment and Construction Products Manager

- KONIEC CERTYFIKATU Z BADAŃ -
- END OF TEST CERTIFICATE -

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

CERTYFIKAT Z BADAŃ
TEST CERTIFICATE

Number **O-B-00262-25**

Klient *Customer*	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Produkt *Product*	Pompa Ciepła powietrze/woda – monoblok *Air/water heat pump –monobloc*
Rodzaj oznaczenie / znak towarowy *Type designation / Trade mark*	**MultiTherma 12 HD** **MultiTherma 12 HD + ElectroBox** **MultiTherma 12 HD + MultiTherma BASIC 5-15** **MultiTherma 12 HD + MultiTherma PRO 5-15** **MultiTherma 12 HD Cascade** **MultiTherma 12 HD Cascade + ElectroBox** **MultiTherma 12 HD Cascade + MultiTherma BASIC 5-15** **MultiTherma 12 HD Cascade + MultiTherma PRO 5-15**
Metoda testowa *Test methods*	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, ČSN EN 14825:2023
Podstawy zaświadczenia *Basis of certificate*	Raport z badań - *Test reports*: 32-11057/2/T z dnia - *of* 2024-07-28 Dokumentacja techniczna przedstawiona przez - *Technical documents of* IGLOO Sp. z o.o
Teplotní aplikace *Temperature application*	**WYSOKOTEMPERATUROWA - *MEDIUM*** Referencyjna temperatura wody 55 °C - *Reference water temperature 55 °C*
Referencyjny okres grzewczy *Reference heating season*	**„A" = Umiarkowany - *„A" = average*** (Warunki obliczeniowe odniesienia dla ogrzewania – *Reference design conditions for heating* $T_{designh}$ = -10 °C)

Specyfikacja warunków - *Specification of conditions*:

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

Wyniki - *Results*:

Zastosowania w średnich temperaturach – *Medium temperature application*

(Referencyjna temperatura wody 55 °C - *Reference water temperature 55 °C*)

Jednostka zewnętrzna – *Outdoor units*	MultiTherma 12 HD	MultiTherma 12 HD	MultiTherma 12 HD	MultiTherma 12 HD

Jednostka wewnętrzna – *Indoor units*		– (Badana / Tested)	**ElectroBox** (Nie badana / Not tested)	**MultiTherma BASIC 5-15** (Nie badana / *Not tested*)	**MultiTherma PRO 5-15** (Nie badana / *Not tested*)
Obciążenie obliczeniowe dla trybu ogrzewania *Full load heating*	**$P_{designh}$ [kW]**	7.49	7.49	7.49	7.49
Temperatura dwuwalencyjna *Bivalent temperature*	**$T_{bivalent}$ [°C]**	-10	-10	-10	-10
Wskaźnik sezonowej efektywności *Seasonal coefficient of performance*	**SCOP [–]**	3.63	3.63	3.5	3.41
Sezonowa efektywność energetyczna ogrzewania pomieszcze *Seasonal Space heating energy efficiency*	**η_s [%]**	142	142	137	133

Jednostka zewnętrzna – *Outdoor units*		**MultiTherma 12 HD Cascade**	**MultiTherma 12 HD Cascade**	**MultiTherma 12 HD Cascade**	**MultiTherma 12 HD Cascade**
Jednostka wewnętrzna – *Indoor units*		– (Nie badana / Not tested)	**ElectroBox** (Nie badana / Not tested)	**MultiTherma BASIC 5-15** (Nie badana / *Not tested*)	**MultiTherma PRO 5-15** (Nie badana / *Not tested*)
Obciążenie obliczeniowe dla trybu ogrzewania *Full load heating*	**$P_{designh}$ [kW]**	7.49	7.49	7.49	7.49
Temperatura dwuwalencyjna *Bivalent temperature*	**$T_{bivalent}$ [°C]**	-10	-10	-10	-10
Wskaźnik sezonowej efektywności *Seasonal coefficient of performance*	**SCOP [–]**	3.63	3.63	3.5	3.41
Sezonowa efektywność energetyczna ogrzewania pomieszcze *Seasonal Space heating energy efficiency*	**η_s [%]**	142	142	137	133

(Badana - *Tested*) Tę próbkę analityczną/warunek zbadano w Laboratorium Badawczym. *This test sample was tested at the Testing Laboratory.*

(Nie badana - *Not tested*) Techniczne dane zostały zgłoszone przez Producenta zgodnie ze specyfikacją linii modeli i nie zostały zbadane przez Laboratorium Badawcze. *The technical data were declared by the Manufacturer according to the model range specifications and were not tested by the Testing Laboratory.*

Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe potwierdza niniejszym certyficatem z badań, że badanie produktu, którego dotyczy dało wyniki wskazane powyżej. Instytut Badawczy Przemysłu Maszynowego, przedsiębiorstwo państwowe jest akredytowanym Laboratorium 1045.1.
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Brno, 2025-02-13

Ing. Mario Jankola
Kierownik ds. Urządzeń Grzewczych i Wyrobów Budowlanych
Heating Equipment and Construction Products Manager

- KONIEC CERTYFIKATU Z BADAŃ -
- END OF TEST CERTIFICATE -

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

CERTYFIKAT Z BADAŃ
TEST CERTIFICATE

Number **O-B-00258-25**

Klient *Customer*	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Produkt *Product*	Pompa Ciepła powietrze/woda – monoblok *Air/water heat pump –monobloc*
Rodzaj oznaczenie / znak towarowy *Type designation / Trade mark*	**MultiTherma 12 HD** **MultiTherma 12 HD + ElectroBox** **MultiTherma 12 HD + MultiTherma BASIC 5-15** **MultiTherma 12 HD + MultiTherma PRO 5-15** **MultiTherma 12 HD Cascade** **MultiTherma 12 HD Cascade + ElectroBox** **MultiTherma 12 HD Cascade + MultiTherma BASIC 5-15** **MultiTherma 12 HD Cascade + MultiTherma PRO 5-15**
Metoda testowa *Test methods*	ČSN EN 12102-1:2023
Podstawy zaświadczenia *Basis of certificate*	Raport z badań - *Test reports*: 32-11057/2/H z dnia - *of* 2024-08-05 Dokumentacja techniczna przedstawiona przez - *Technical documents of* IGLOO Sp. z o.o

Specyfikacja warunków - *Specification of conditions*:

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

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. 03

Wyniki - *Results*:

Jednostka zewnętrzna – *Outdoor units*			**MultiTherma 12 HD**	**MultiTherma 12 HD**	**MultiTherma 12 HD**	**MultiTherma 12 HD**
Jednostka wewnętrzna – *Indoor units*			**–**	**ElectroBox**	**MultiTherma BASIC 5-15**	**MultiTherma PRO 5-15**
Warunki cieplne* – *Temperature conditions**			(Badana / *Tested*)	(Nie badana / *Not tested*)	(Nie badana / *Not tested*)	(Nie badana / *Not tested*)
Poziom mocy akustycznej dla danych warunków temperaturowych A7/W55* (28 Hz) – *Sound power level at condition A7/W55* (28 Hz)*						
L_{WA}	Jednostka wewnętrzna – *Indoor unit*	[dB(A)]	–	–	28 ± 1.5	29 ± 1.5
	Jednostka zewnętrzna – *Outdoor unit*	[dB(A)]	53 ± 1.5	53 ± 1.5	53 ± 1.5	53 ± 1.5
Klasa dokładności *Accuracy class*	Jednostka wewnętrzna – *Indoor unit*			Techniczna (2) – *Engineering (2)*		
	Jednostka zewnętrzna – *Outdoor unit*			Techniczna (2) – *Engineering (2)*		

Jednostka zewnętrzna – *Outdoor units*			**MultiTherma 12 HD Cascade**	**MultiTherma 12 HD Cascade**	**MultiTherma 12 HD Cascade**	**MultiTherma 12 HD Cascade**
Jednostka wewnętrzna – *Indoor units*			**–**	**ElectroBox**	**MultiTherma BASIC 5-15**	**MultiTherma PRO 5-15**
Warunki cieplne* – *Temperature conditions**			(Nie badana / *Not tested*)	(Nie badana / *Not tested*)	(Nie badana / *Not tested*)	(Nie badana / *Not tested*)
Poziom mocy akustycznej dla danych warunków temperaturowych A7/W55* (28 Hz) – *Sound power level at condition A7/W55* (28 Hz)*						
L_{WA}	Jednostka wewnętrzna – *Indoor unit*	[dB(A)]	–	–	28 ± 1.5	29 ± 1.5
	Jednostka zewnętrzna – *Outdoor unit*	[dB(A)]	53 ± 1.5	53 ± 1.5	53 ± 1.5	53 ± 1.5
Klasa dokładności *Accuracy class*	Jednostka wewnętrzna – *Indoor unit*			Techniczna (2) – *Engineering (2)*		
	Jednostka zewnętrzna – *Outdoor unit*			Techniczna (2) – *Engineering (2)*		

(*) Uwagi do skróconych oznaczeń: np. A7/W35: A (powietrze), 7 (temperatura wejściowa - temperatura termometru suchego) w °C, W (woda), 35 (temperatura wyjściowa) w °C. *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).*

(Badana - *Tested*) Tę próbkę analityczną/warunek zbadano w Laboratorium Badawczym. *This test sample was tested at the Testing Laboratory.*

(Nie badana - *Not tested*) Techniczne dane zostały zgłoszone przez Producenta zgodnie ze specyfikacją linii modeli i nie zostały zbadane przez Laboratorium Badawcze. *The technical data were declared by the Manufacturer according to the model range specifications and were not tested by the Testing Laboratory.*

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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, 2025-02-13

Ing. Mario Jankola
Kierownik ds. Urządzeń Grzewczych i Wyrobów Budowlanych
Heating Equipment and Construction Products Manager

- KONIEC CERTYFIKATU Z BADAŃ -
- END OF TEST CERTIFICATE -

STROJÍRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p. 03

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
32-11057/2/T

Product:	Outdoor Air/Water Heat pump - monobloc
Type designation:	**MultiTherma 12 HD**
Customer:	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Manufacturer:	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Report issue date:	2024-07-28
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

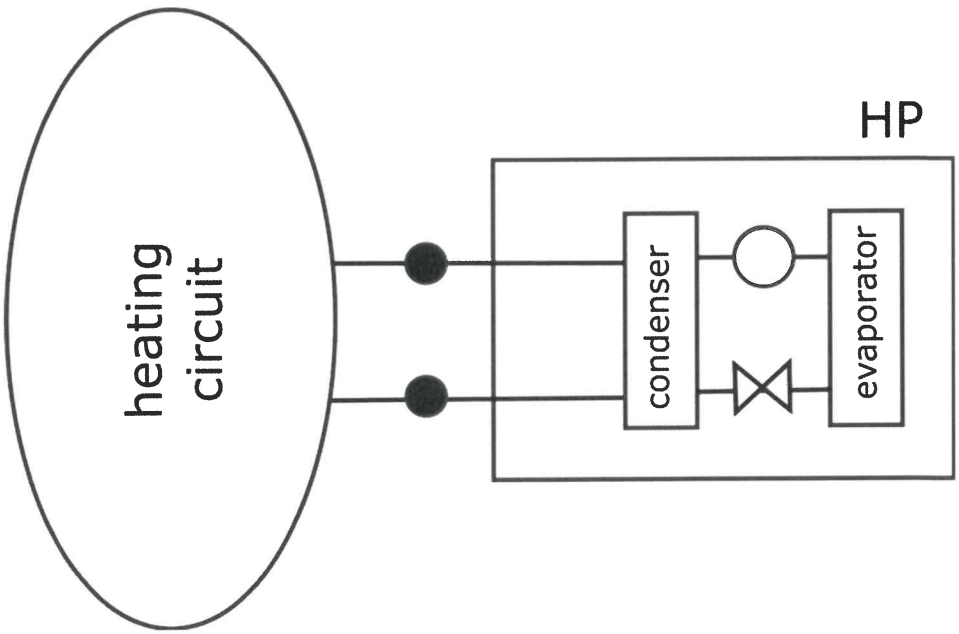
I. Description of product tested

The Heat pump **MultiTherma 12 HD** supplied by the company **IGLOO Sp. z o.o.** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outside. Refrigerant R290 is used with charge 2 kg. Power supply is a three-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with variable flow rate.

Main components of the outdoor unit **MultiTherma 12 HD**:

- Serial number NS-077766
- Cubic shape with dimensions 1376 × 572 × 1270 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows, dimensions 1360 × 43,3 × 1186,5 mm (W × D × H), spacing 1.5 mm
- Plate condenser, dimensions 185 × 130 × 590 mm (W × D × H) including insulation
- Compressor Siam Compressor Industry APB33FAAMT
- Refrigerant R290 (2 kg)
- Liquid refrigerant separator Frigomec 05/S-S-34-ODS 18/12
- Liquid tank Frigomec RV-100X222
- 3x electric expansion valve Carel E2V11 FSBC1
- 4-way reversing valve Sanhua SHF-20D-67-02 with coil Sanhua
- 2x axial fan Ø 50 cm Ziehl-Abegg FN050-ZIA.OF.A5P4
- 2x pressure transmitter Danfoss MBS 3000
- 2x pressure switch Danfoss
- Liquid line filter drier Sanhua
- Temperature sensors
- Pressure sensors
- Refrigerant pipes

Scheme:



Photodocumentation:

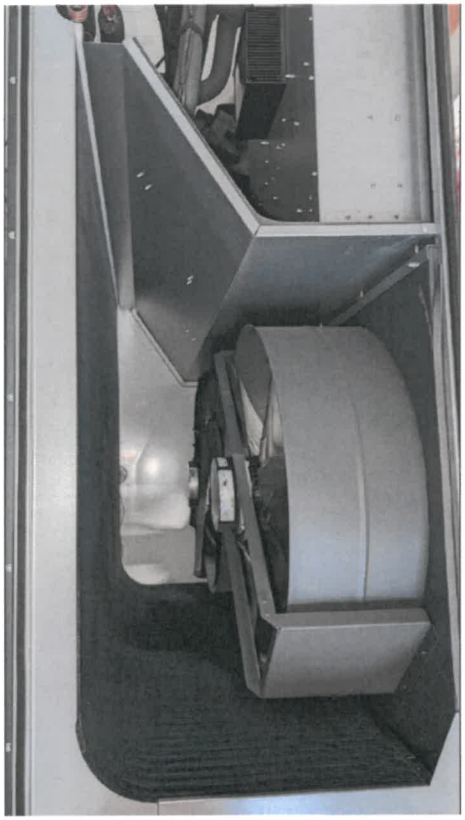
Heat pump **MultiTherma 12 HD** – outdoor unit
– Front view –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Back view –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Compressor label –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Label –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Without cover (side view)–



Heat pump **MultiTherma 12 HD** – outdoor unit
– Without cover (top view) –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.40178.001	**MultiTherma 12 HD**	2024-06-14

The visual inspection, tests and verification were carried out by Ing. Jakub Čederle 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	E3.1
2.	Digital watt meter	1.2.3 ENERGIE ANALYZATOR_3
3.	Flow meter Krohne Optiflux	8.1.5 TECH_K3_V_DN15_SEK
4.	Barometer	2.4 MAR18_1_PB
5.	Differential pressure gauge	14.2.2 MAR18_3_dP_2
6.	Temperature-humidity meter HF532	14.1.1 K3_VLHKOST_1
7.	Temperature-humidity meter HF532	14.1.3 K3_VLHKOST_2
8.	Thermometers	14.4 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. 7	x
2.	Seasonal performance tests and SCOP calculation – Low temperature application	–	ČSN EN 14511-3:2023 ČSN EN 14825:2023	Page No. 8 – 14	x
3.	Seasonal performance tests and SCOP calculation – Medium temperature application	–	ČSN EN 14511-3:2023 ČSN EN 14825:2023	Page No. 15 – 21	x
4.	Safety tests	Art. 4.2.1.2 Art. 4.5 sect. a) Art. 4.5 sect. b) Art. 4.6	ČSN EN 14511-4:2023	Page No. 22 – 24	+

*) **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 **MultiTherma 12 HD**
Measuring equipment used:	see Chapter III

Specification of the assessment condition		**A7/W35**	**A7/W55**
Date of testing		**2024-07-01**	**2024-07-01**
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]	34.97	55.17
Input heating water – temperature calculation	[°C]	29.99	47.00
Output heating water temperature	[°C]	34.97	55.17
Input heating water temperature	[°C]	29.99	47.00
Air temperature – dry bulb temperature	[°C]	7.00	6.99
Air temperature – wet bulb temperature	[°C]	6.01	6.00
Relative humidity	[%]	87.04	87.01
Barometric pressure	[kPa]	97.940	97.966
Ambient temperature	[°C]	7.00	6.96
Secondary circuit pressure difference	[kPa]	-3.119	-0.948
Efficiency of the secondary liquid pump	[–]	0.120	0.114
Volume flow rate of heating water	$[m^3 \cdot h^{-1}]$	0.7061	0.3779
Density of heating water	$[kg \cdot m^{-3}]$	994.0	986.2
Specific heat capacity of heating water	$[kJ \cdot kg^{-1} \cdot K^{-1}]$	4.175	4.179
Voltage	[V]	403.24	399.82
Total current	[A]	5.09	6.93
Overall power input	[kW]	0.787	1.182
Capacity correction of sec. liquid pump	[W]	-4.482	-0.777
Power input correction of sec. liquid pump	[W]	-5.09	-0.88
Heating capacity – heating water	[kW]	4.051	3.547
Corrected heating capacity – heating water	**[kW]**	**4.056**	**3.548**
Uncertainty of corrected heating capacity	[kW]	± 0.070	± 0.038
Effective electric power input	**[kW]**	**0.792**	**1.183**
COP	**[–]**	**5.122**	**2.998**
Uncertainty of COP	[–]	± 0.089	± 0.032
Control settings	**[Hz]**	**36**	**36**
Circulation pump settings – heating water	[–]	–	–

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 **MultiTherma 12 HD**
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			Variable		
Seasonal space heating energy efficiency	Heating	Average	η_s		**190.3**	%
		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	$P_{designh}$		**8.22**	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		-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}		3514	kWh
		Warmer	Q_{HE}		–	kWh
		Colder	Q_{HE}		–	kWh
Modes other than „active mode“	Off mode			P_{OFF}	22.7	W
	Thermostat off mode			P_{TO}	22.4	W
	Standby mode			P_{SB}	22.7	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}	0.0224	[kW]
P_{SB}	0.0227	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0227	[kW]
$P_{designh}$	8.22	[kW]
$SCOP_{ON}$	4.84	[–]

Coefficient and correction:

F(1)	3	[%]
F(2)	0	[%]
CC	2.5	[–]

Calculation of SCOP:

7.3 Calculation of the reference annual heating demand (Q_H)

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

$Q_H = 8.22 \cdot 2066 = 16980$ [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]

$Q_{HE} = 16980 / 4.84 + 178 \cdot 0.0224 + 0 \cdot 0.0227 + 178 \cdot 0 + 0 \cdot 0.0227 = 3514$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 16980 / 3514 = 4.83$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

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

$\eta_s (A) = (1 / 2.5) \cdot 4.83 - 0.03 =$ **1.903** [–]

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/W27**
Date of testing		**2024-07-09**	**2024-07-08**	**2024-07-03**
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]	33.95	29.96	26.90
Input heating water – temperature calculation	[°C]	28.97	24.96	21.99
Output heating water temperature	[°C]	33.95	29.96	26.90
Input heating water temperature	[°C]	28.97	24.96	21.99
Air temperature – dry bulb temperature	[°C]	-6.99	2.01	7.00
Air temperature – wet bulb temperature	[°C]	-8.00	1.01	6.02
Relative humidity	[%]	74.92	83.98	87.01
Barometric pressure	[kPa]	98.703	98.767	97.930
Ambient temperature	[°C]	-6.95	1.90	7.01
Secondary circuit pressure difference	[kPa]	-7.117	-3.270	-1.305
Efficiency of the secondary liquid pump	[–]	0.142	0.121	0.115
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	1.1585	0.7633	0.4821
Density of heating water	[$kg \cdot m^{-3}$]	994.2	995.5	996.4
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.175	4.176	4.177
Voltage	[V]	401.75	230.64	401.94
Total current	[A]	10.32	5.78	3.25
Overall power input	[kW]	2.092	0.948	0.420
Capacity correction of sec. liquid pump	[W]	-13.872	-5.030	-1.351
Power input correction of sec. liquid pump	[W]	-16.16	-5.72	-1.53
Heating capacity – heating water	[kW]	6.634	4.389	2.727
Corrected heating capacity – heating water	**[kW]**	**6.648**	**4.394**	**2.729**
Uncertainty of corrected heating capacity	[kW]	± 0.115	± 0.076	± 0.048
Effective electric power input	**[kW]**	**2.108**	**0.954**	**0.422**
COP	**[–]**	**3.154**	**4.606**	**6.468**
Uncertainty of COP	[–]	± 0.055	± 0.080	± 0.114
Control settings	**[Hz]**	**88**	**40**	**23**
Circulation pump settings – heating water	[–]	–	–	–

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/W24**	**A-10/W35**
Date of testing		**2024-07-04**	**2024-07-02**
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]	23.86	34.95
Input heating water – temperature calculation	[°C]	20.36	29.97
Output heating water temperature	[°C]	23.86	34.95
Input heating water temperature	[°C]	20.36	29.97
Air temperature – dry bulb temperature	[°C]	12.00	-9.99
Air temperature – wet bulb temperature	[°C]	11.00	-11.00
Relative humidity	[%]	89.00	69.71
Barometric pressure	[kPa]	97.906	97.943
Ambient temperature	[°C]	12.08	-10.36
Secondary circuit pressure difference	[kPa]	-0.351	-10.507
Efficiency of the secondary liquid pump	[–]	0.113	0.166
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	0.3040	1.4293
Density of heating water	[$kg \cdot m^{-3}$]	997.1	994.0
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.179	4.175
Voltage	[V]	399.61	401.93
Total current	[A]	1.57	15.91
Overall power input	[kW]	0.169	3.166
Capacity correction of sec. liquid pump	[W]	-0.233	-21.008
Power input correction of sec. liquid pump	[W]	-0.26	-25.18
Heating capacity – heating water	[kW]	1.225	8.198
Corrected heating capacity – heating water	**[kW]**	**1.225**	**8.219**
Uncertainty of corrected heating capacity	[kW]	± 0.030	± 0.142
Effective electric power input	**[kW]**	**0.169**	**3.192**
COP	**[–]**	**7.242**	**2.575**
Uncertainty of COP	[–]	± 0.179	± 0.045
Control settings	**[Hz]**	**9**	**120**
Circulation pump settings – heating water	[–]	–	–

Data for SCOP calculation

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

	Outdoor heat exchanger Outdoor air inlet	Indoor heat exchanger Outlet water temperature	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eff. power input of compressor off state
	[°C]	[°C]	[%]	[kW]	[kW]	[–]	[–]	[–]	[–]	[kW]
A	-7	34.00	88.46	7.27	6.648	3.154	0.900	1.00	3.154	–
B	2	30.00	53.85	4.43	4.394	4.606	0.900	1.00	4.606	–
C	7	27.00	34.62	2.85	2.729	6.468	0.900	1.00	6.468	–
D	12	24.00	15.38	1.26	1.225	7.242	0.900	1.00	7.242	–
TOL (E)	-10	35.00	100.00	8.22	8.219	2.575	0.900	1.00	2.575	–
Tbiv (F)	-10	35.00	100.00	8.22	8.219	2.575	0.900	1.00	2.575	–

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
- Variable 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 variable flow:

$\Delta t = 5$

$CR \cdot \Delta t$ = Part load / Declared capacity · 5

$t_{outlet,\,capacity\,test,\,variable\,flow} = t_{outlet,\,average} + 5$ - Part load / Declared capacity · 5

Measured data:

$t_{outlet,\,average}$	24.00	[°C]
Declared capacity	1.225	[kW]
Declared capacity $_{standard\,rating\,condition\,A7/W35}$	–	[kW]
Part load	1.26	[kW]

Calculation of water temperature

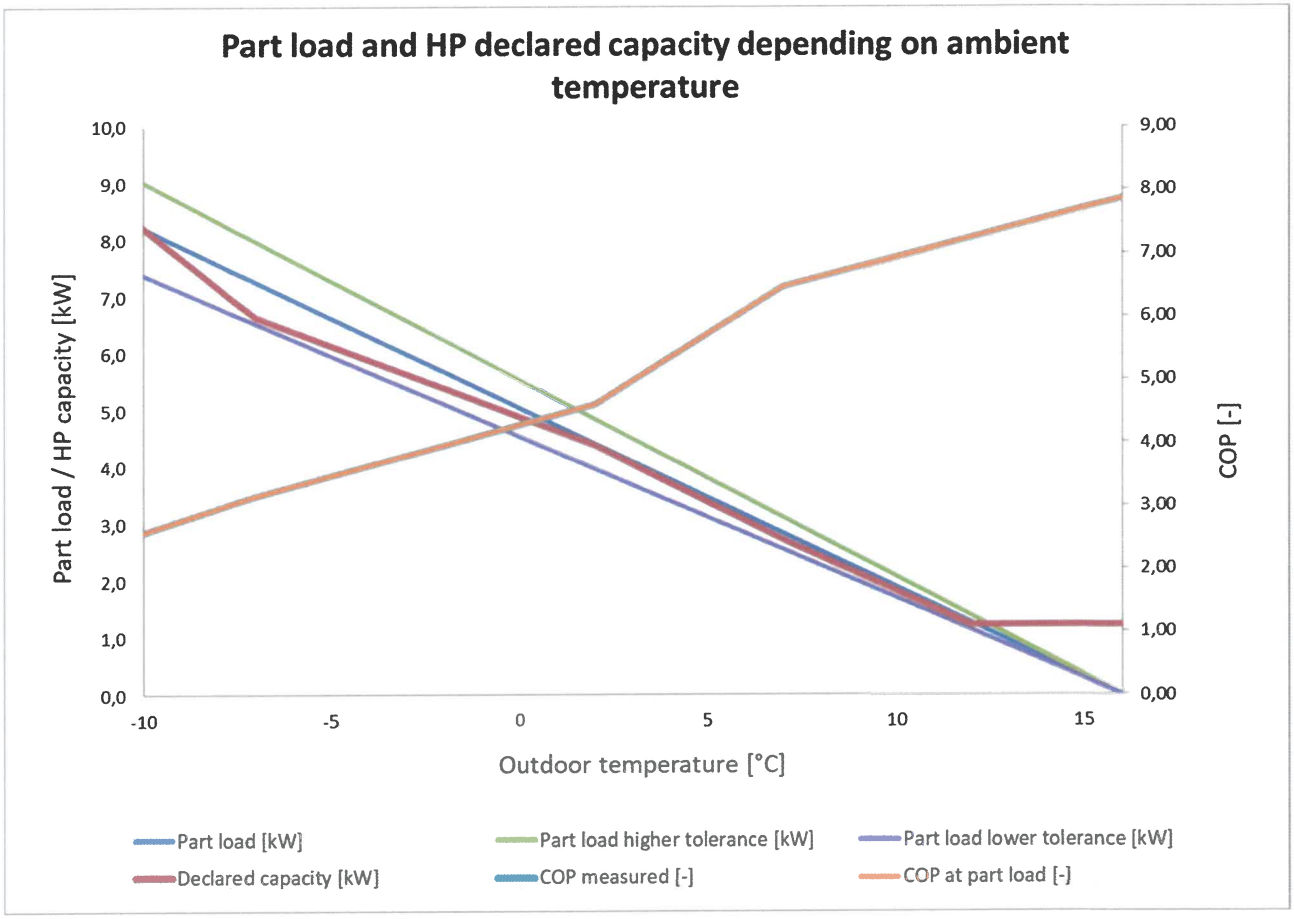
$t_{outlet,\,capacity\,test,\,variable\,flow} = 24 + 5 - 1.26 / 1.225 \cdot 5 =$ **24.0** [°C]

Calculation SCOP, $SCOP_{on}$, $SCOP_{net}$
- Low temperature application (reference water temperature 35 °C)
- Reference heating season „A“ – average

	Bin j [–]	Outdoor temp. (dry bulb) Tj [°C]	Hours hj [h]	Part load ratio [%]	Heat load Ph(Tj) [kW]	Capacity of HP [kW]	Heat load covered by heat pump [kW]	Resistive heat elbu (Tj) elbu(Tj) [kW]	Annual resistive heat hj x elbu(Tj) [kWh]	COPbin (Tj) COPbin (Tj) [–]	Annual heating demand hj x P h(Tj) [kWh]	Annual power input including electric back up heating [kWh]	Net annual heating capacity hj × (P h(Tj) - elbu(Tj)) [kWh]	Net annual power input without electric back up heating [kWh]
TOL(E), Tbiv(F)	21	-10	1	100.00	8.22	8.22	8.22	0.00	0.00	2.58	8	3	8	3
	22	-9	25	96.15	7.90	7.70	7.70	0.00	0.00	2.77	198	71	198	71
	23	-8	23	92.31	7.59	7.17	7.17	0.00	0.00	2.96	174	59	174	59
A	24	-7	24	88.46	7.27	6.65	6.65	0.00	0.00	3.15	174	55	174	55
	25	-6	27	84.62	6.95	6.40	6.40	0.00	0.00	3.32	188	57	188	57
	26	-5	68	80.77	6.64	6.15	6.15	0.00	0.00	3.48	451	130	451	130
	27	-4	91	76.92	6.32	5.90	5.90	0.00	0.00	3.64	575	158	575	158
	28	-3	89	73.08	6.01	5.65	5.65	0.00	0.00	3.80	535	141	535	141
	29	-2	165	69.23	5.69	5.40	5.40	0.00	0.00	3.96	939	237	939	237
	30	-1	173	65.38	5.37	5.15	5.15	0.00	0.00	4.12	930	226	930	226
	31	0	240	61.54	5.06	4.89	4.89	0.00	0.00	4.28	1214	283	1214	283
	32	1	280	57.69	4.74	4.64	4.64	0.00	0.00	4.44	1328	299	1328	299
B	33	2	320	53.85	4.43	4.39	4.39	0.00	0.00	4.61	1416	307	1416	307
	34	3	357	50.00	4.11	4.06	4.06	0.00	0.00	4.98	1467	295	1467	295
	35	4	356	46.15	3.79	3.73	3.73	0.00	0.00	5.35	1350	252	1350	252
	36	5	303	42.31	3.48	3.40	3.40	0.00	0.00	5.72	1054	184	1054	184
	37	6	330	38.46	3.16	3.06	3.06	0.00	0.00	6.10	1043	171	1043	171
C	38	7	326	34.62	2.85	2.73	2.73	0.00	0.00	6.47	927	143	927	143
	39	8	348	30.77	2.53	2.43	2.43	0.00	0.00	6.62	880	133	880	133
	40	9	335	26.92	2.21	2.13	2.13	0.00	0.00	6.78	741	109	741	109
	41	10	315	23.08	1.90	1.83	1.83	0.00	0.00	6.93	597	86	597	86
	42	11	215	19.23	1.58	1.53	1.53	0.00	0.00	7.09	340	48	340	48
D	43	12	169	15.38	1.26	1.23	1.23	0.00	0.00	7.24	214	30	214	30
	44	13	151	11.54	0.95	0.92	0.92	0.00	0.00	7.40	143	19	143	19
	45	14	105	7.69	0.63	0.62	0.62	0.00	0.00	7.55	66	9	66	9
	46	15	74	3.85	0.32	0.32	0.32	0.00	0.00	7.71	23	3	23	3
		Σ	4910							Σ	16977	3509	16977	3509

SCOPon	4.84	SCOPnet	4.84
		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 **MultiTherma 12 HD**
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			Variable		
Seasonal space heating energy efficiency	Heating	Average	η_s		**142.3**	%
		Warmer	η_s		–	%
		Colder	η_s		–	%
Seasonal efficiency according to ČSN EN 14825:2023	Heating	Average	**SCOP**		**3.63**	–
		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	$P_{designh}$		**7.49**	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		-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}		4262	kWh
		Warmer	Q_{HE}		–	kWh
		Colder	Q_{HE}		–	kWh
Modes other than „active mode“	Off mode			P_{OFF}	22.7	W
	Thermostat off mode			P_{TO}	22.4	W
	Standby mode			P_{SB}	22.7	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}	0.0224	[kW]
P_{SB}	0.0227	[kW]
P_{CK}	0.0000	[kW]
P_{OFF}	0.0227	[kW]
$P_{designh}$	7.49	[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]

$Q_H = 7.49 \cdot 2066 = 15483$ [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]

$Q_{HE} = 15483 / 3.64 + 178 \cdot 0.0224 + 0 \cdot 0.0227 + 178 \cdot 0 + 0 \cdot 0.0227 = 4262$ [kWh]

7.2 General formula for calculation of reference SCOP

$SCOP = Q_H / Q_{HE}$ [–]

$SCOP = 15483 / 4262 = 3.63$ [–]

7.1 Calculation of the seasonal space heating efficiency η_s

$\Sigma F(i) = F(1) + F(2)$ [–]

$\Sigma F = 0.03 + 0 = 0.03$ [–]

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

η_s (A) $= (1 / 2.5) \cdot 3.63 - 0.03 =$ **1.423** [–]

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/W36**
Date of testing		**2024-07-09**	**2024-07-08**	**2024-07-03**
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]	52.01	41.99	35.96
Input heating water – temperature calculation	[°C]	44.02	33.99	27.98
Output heating water temperature	[°C]	52.01	41.99	35.96
Input heating water temperature	[°C]	44.02	33.99	27.98
Air temperature – dry bulb temperature	[°C]	-6.99	1.99	7.01
Air temperature – wet bulb temperature	[°C]	-8.01	1.11	6.02
Relative humidity	[%]	74.64	85.72	87.00
Barometric pressure	[kPa]	98.812	98.746	97.756
Ambient temperature	[°C]	-6.97	1.88	7.01
Secondary circuit pressure difference	[kPa]	-2.794	-1.065	-0.467
Efficiency of the secondary liquid pump	[–]	0.119	0.114	0.113
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	0.7172	0.4191	0.2800
Density of heating water	[$kg \cdot m^{-3}$]	987.3	991.7	993.8
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.178	4.175	4.175
Voltage	[V]	400.96	230.39	401.72
Total current	[A]	14.04	6.33	3.82
Overall power input	[kW]	2.947	1.107	0.522
Capacity correction of sec. liquid pump	[W]	-4.106	-0.965	-0.286
Power input correction of sec. liquid pump	[W]	-4.66	-1.09	-0.32
Heating capacity – heating water	[kW]	6.588	3.858	2.573
Corrected heating capacity – heating water	**[kW]**	**6.592**	**3.859**	**2.574**
Uncertainty of corrected heating capacity	[kW]	± 0.073	± 0.043	± 0.028
Effective electric power input	**[kW]**	**2.952**	**1.108**	**0.522**
COP	**[–]**	**2.233**	**3.484**	**4.929**
Uncertainty of COP	[–]	± 0.025	± 0.039	± 0.055
Control settings	**[Hz]**	**91**	**40**	**23**
Circulation pump settings – heating water	[–]	–	–	–

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/W30**	**A-10/W55**
Date of testing		**2024-07-26**	**2024-07-02**
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]	29.82	54.99
Input heating water – temperature calculation	[°C]	21.99	47.00
Output heating water temperature	[°C]	29.82	54.99
Input heating water temperature	[°C]	21.99	47.00
Air temperature – dry bulb temperature	[°C]	12.00	-10.00
Air temperature – wet bulb temperature	[°C]	11.00	-10.91
Relative humidity	[%]	88.99	72.39
Barometric pressure	[kPa]	98.245	97.985
Ambient temperature	[°C]	12.25	-10.42
Secondary circuit pressure difference	[kPa]	-0.083	-3.647
Efficiency of the secondary liquid pump	[–]	0.112	0.123
Volume flow rate of heating water	[$m^3 \cdot h^{-1}$]	0.1319	0.8158
Density of heating water	[$kg \cdot m^{-3}$]	995.7	986.0
Specific heat capacity of heating water	[$kJ \cdot kg^{-1} \cdot K^{-1}$]	4.176	4.179
Voltage	[V]	399.63	400.10
Total current	[A]	1.88	20.84
Overall power input	[kW]	0.197	4.373
Capacity correction of sec. liquid pump	[W]	-0.024	-5.904
Power input correction of sec. liquid pump	[W]	-0.03	-6.73
Heating capacity – heating water	[kW]	1.189	7.488
Corrected heating capacity – heating water	**[kW]**	**1.189**	**7.494**
Uncertainty of corrected heating capacity	[kW]	± 0.013	± 0.082
Effective electric power input	**[kW]**	**0.197**	**4.380**
COP	**[–]**	**6.024**	**1.711**
Uncertainty of COP	[–]	± 0.069	± 0.019
Control settings	**[Hz]**	**9**	**120**
Circulation pump settings – heating water	[–]	–	–

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	6.63	6.592	2.233	0.900	1.00	2.233	–
B	2	42.00	53.85	4.04	3.859	3.484	0.900	1.00	3.484	–
C	7	36.00	34.62	2.59	2.574	4.929	0.900	1.00	4.929	–
D	12	30.00	15.38	1.15	1.189	6.024	0.900	1.00	6.024	–
TOL (E)	-10	55.00	100.00	7.49	7.494	1.711	0.900	1.00	1.711	–
Tbiv (F)	-10	55.00	100.00	7.49	7.494	1.711	0.900	1.00	1.711	–

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
- Variable 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 variable flow:

$\Delta t = 8$

$CR \cdot \Delta t$ = Part load / Declared capacity · 8

$t_{outlet,\,capacity\,test,\,variable\,flow} = t_{outlet,\,average} + 8$ - Part load / Declared capacity · 8

Measured data:

$t_{outlet,\,average}$	30.00	[°C]
Declared capacity	1.189	[kW]
Declared capacity $_{standard\,rating\,condition\,A7/W55}$	–	[kW]
Part load	1.15	[kW]

Calculation of water temperature

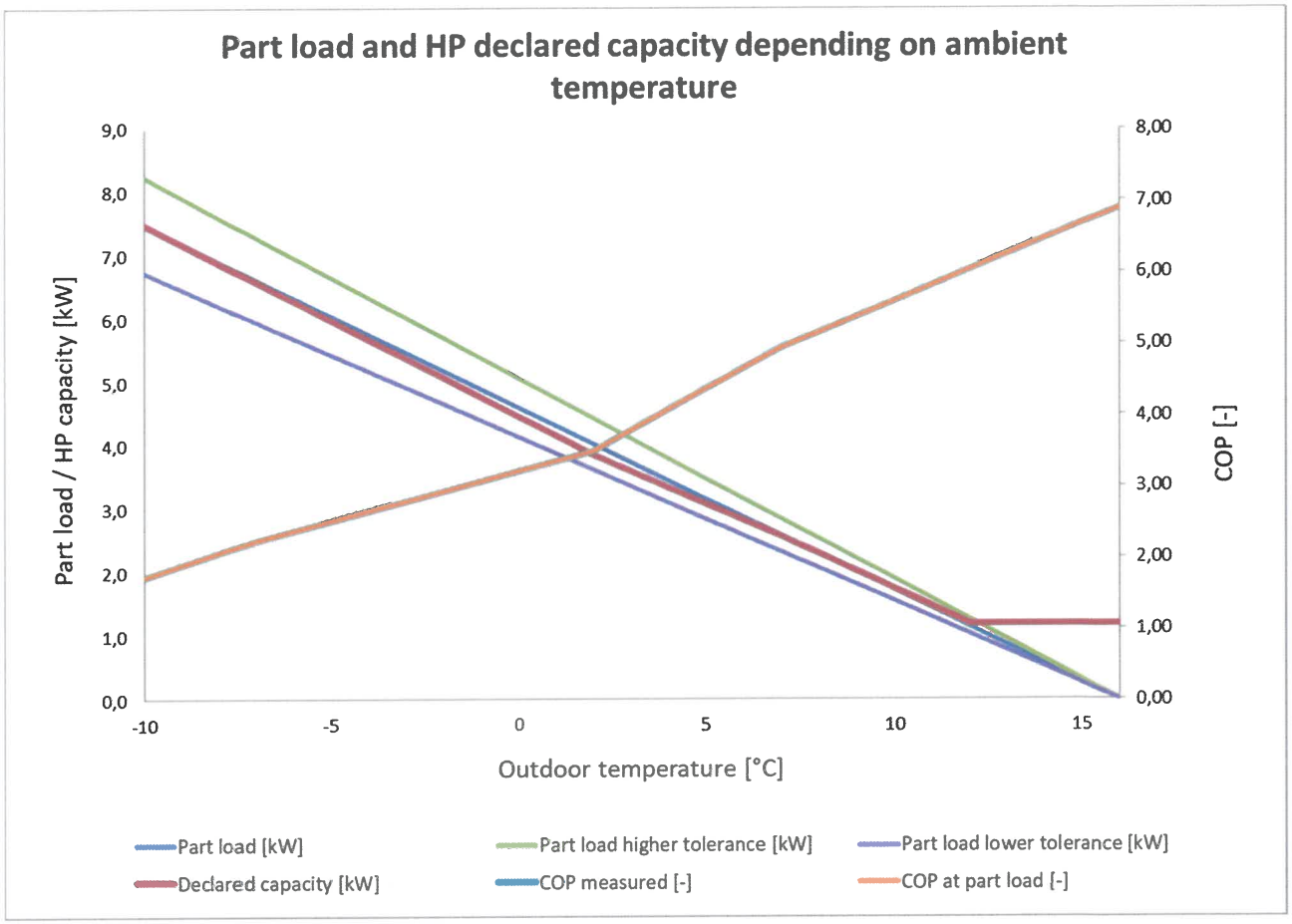
$t_{outlet,\,capacity\,test,\,variable\,flow} = 30 + 8 - 1.15 / 1.189 \cdot 8 =$ **30.0** [°C]

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), Tbiv(F)	21	-10	1	100.00	7.49	7.49	7.49	0.00	0.00	1.71	7	4	7	4
	22	-9	25	96.15	7.21	7.19	7.19	0.00	0.00	1.89	180	96	180	96
	23	-8	23	92.31	6.92	6.89	6.89	0.00	0.00	2.06	159	77	159	77
A	24	-7	24	88.46	6.63	6.59	6.59	0.00	0.00	2.23	159	71	159	71
	25	-6	27	84.62	6.34	6.29	6.29	0.00	0.00	2.37	171	72	171	72
	26	-5	68	80.77	6.05	5.98	5.98	0.00	0.00	2.51	412	164	412	164
	27	-4	91	76.92	5.76	5.68	5.68	0.00	0.00	2.65	525	198	525	198
	28	-3	89	73.08	5.48	5.38	5.38	0.00	0.00	2.79	487	175	487	175
	29	-2	165	69.23	5.19	5.07	5.07	0.00	0.00	2.93	856	292	856	292
	30	-1	173	65.38	4.90	4.77	4.77	0.00	0.00	3.07	848	276	848	276
	31	0	240	61.54	4.61	4.47	4.47	0.00	0.00	3.21	1107	345	1107	345
	32	1	280	57.69	4.32	4.16	4.16	0.00	0.00	3.35	1211	362	1211	362
B	33	2	320	53.85	4.04	3.86	3.86	0.00	0.00	3.48	1291	371	1291	371
	34	3	357	50.00	3.75	3.60	3.60	0.00	0.00	3.77	1338	355	1338	355
	35	4	356	46.15	3.46	3.35	3.35	0.00	0.00	4.06	1231	303	1231	303
	36	5	303	42.31	3.17	3.09	3.09	0.00	0.00	4.35	961	221	961	221
	37	6	330	38.46	2.88	2.83	2.83	0.00	0.00	4.64	951	205	951	205
C	38	7	326	34.62	2.59	2.57	2.57	0.00	0.00	4.93	846	172	846	172
	39	8	348	30.77	2.31	2.30	2.30	0.00	0.00	5.15	802	156	802	156
	40	9	335	26.92	2.02	2.02	2.02	0.00	0.00	5.37	676	126	676	126
	41	10	315	23.08	1.73	1.74	1.73	0.00	0.00	5.59	545	98	545	98
	42	11	215	19.23	1.44	1.47	1.44	0.00	0.00	5.81	310	53	310	53
D	43	12	169	15.38	1.15	1.19	1.15	0.00	0.00	6.02	195	32	195	32
	44	13	151	11.54	0.86	0.91	0.86	0.00	0.00	6.24	131	21	131	21
	45	14	105	7.69	0.58	0.64	0.58	0.00	0.00	6.46	61	9	61	9
	46	15	74	3.85	0.29	0.36	0.29	0.00	0.00	6.68	21	3	21	3
		Σ	4910							Σ	15480	4257	15480	4257

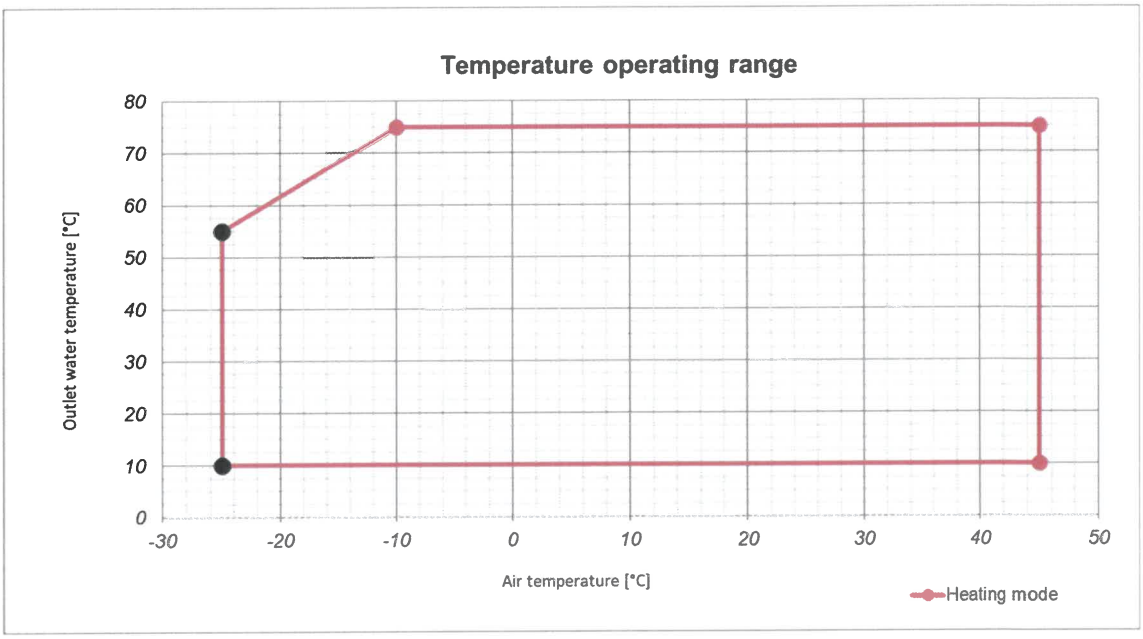
SCOPon	3.64	SCOPnet	3.64
		SCOP	**3.63**

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



Test objective:	Safety tests
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 14511-4:2023
Sample tested:	Heat pump **MultiTherma 12 HD**
Measuring equipment used:	see Chapter III

1) Temperature operating range



Test point	Inlet air dry bulb temperature [°C]		Outlet heating water temperature [°C]		Water flow rate in condenser [m³/h]	Note
Heating mode						
1.	A	–25	W	5	Minimum	Minimum water flow rate: **0.1319**
2.	A	–25	W	50	Minimum	

Heat pump **MultiTherma 12 HD** is fully operational in the temperature operating range.

Starting and operating tests (heating mode)

Test according to Article 4.2.1.2 of ČSN EN 14511-4:2023

Operational requirements conditions for air-to-water units					
Test point	**Inlet temperature at outdoor heat exchanger (°C)**	**Inlet temperature at indoor heat exchanger (°C)**	**Water flow rate at indoor heat exchanger**	**Voltage (V)**	**Test result**
1 (starting)	Lower limit of use	Lower limit of use	minimum	Rated voltage	+
2 (operating)	Lower limit of use	Upper limit of use	minimum	Rated voltage	+

Evaluation: +... For a starting test, the unit shall start and operate during 15 min, for an operating test, the unit shall be able to operate during 1 h, without tripping of the motor overload protective devices.

–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

Starting and operating tests (cooling mode)

Test according to Article 4.2.1.3 of ČSN EN 14511-4:2023

Operational requirements conditions for air-to-water units					
Test point	**Inlet temperature at outdoor heat exchanger (°C)**	**Inlet temperature at indoor heat exchanger (°C)**	**Water flow rate at indoor heat exchanger**	**Voltage (V)**	**Test result**
1 (starting)	Lower limit of use	Lower limit of use	minimum	Rated voltage	x
2 (starting)	Upper limit of use	Upper limit of use	maximum	Rated voltage	x

Evaluation:
+... For a starting test, the unit shall start and operate during 15 min, without tripping of the motor overload protective devices.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

2) Outside the operating range

Requirements for outside the operating range	Requirement specification	Test result	Note
If operating outside the temperature range can cause damage to the unit, it shall be provided with safety devices which ensure that the unit suffers no damage when the operating limits of use indicated by the manufacturer are exceeded and remains capable of operating when coming back within these limits. A safety device that does not automatically reset may trip provided that a warning device is fitted. The manufacturer shall indicate any safety devices provided and their operating conditions according to 7.2.3.	ČSN EN 14511-4:2023 Art. 4.3	x	–

Evaluation:
+... The unit fulfills test requirements.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

3) Freeze-up test in cooling mode

Air-to-air and water(brine)-to-air units

Required operating conditions	Test result	Note
Test according to Article 4.4 of ČSN EN 14511-4:2023	0	–

Evaluation:
+... After the unit has operated for 6 hours or after the last freeze up cycle has been completed after these 6 h, the following requirements shall be fulfilled:
- no ice shall have accumulated on the evaporator;
- no ice shall drip from the unit;
- no water shall drip or be blown off the unit into the room.

–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

4) Shutting off the heat transfer medium flows

Required operating conditions	Test result	Note
Test for section a) Art. 4.5 ČSN EN 14511-4:2023 – heating	+	Unit tried increasing to keep the capacity stable, then continued with lowered capacity. After restoring the flow, the unit returned to running with original parameters.
Test for section a) Art. 4.5 ČSN EN 14511-4:2023 – cooling	x	–
Test for section b) Art. 4.5 ČSN EN 14511-4:2023 – heating	+	After the flow stopped, unit switched off immediately, then tried to start several times. After restoring the flow and resetting the alarm unit returned to running with original parameters.
Test for section b) Art. 4.5 ČSN EN 14511-4:2023 – cooling	x	–
Test for section c) Art. 4.5 ČSN EN 14511-4:2023	0	–

Evaluation:
+... The unit shall remain capable of operating after restoration of the flow rates for 30 min once the compressor has restarted.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

5) Complete power supply failure

Required operating conditions	Test result	Note
Test according to Article 4.6 of ČSN EN 14511-4:2023	+	–

Evaluation:
+... The unit has to restart automatically within 30 min. When manufacturer states that the unit does not automatically restart, fault detection is necessary. The unit is checked for any damage sustained during the test and if any safety devices have operated during the test.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

6) Condensate draining and enclosure sweat test

Air-to-air and water(brine)-to-air units

Required operating conditions	Test result	Note
Test according to Article 4.7 of ČSN EN 14511-4:2023	0	–

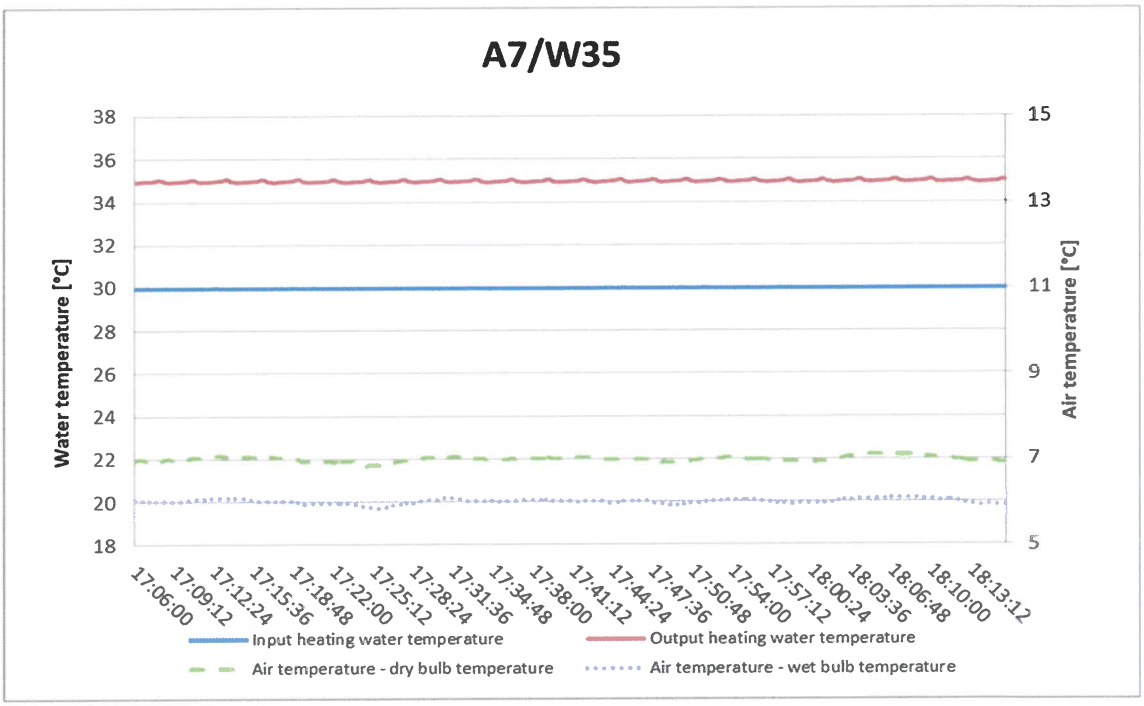
Evaluation:
+... During the test of 4 hours no condensed water shall drip, run or blow off the unit except through the drain. For indoor units, drain holes shall be provided with suitable pipe connection, the minimum diameter of which shall be 12 mm.
–... The unit did not fulfill test requirements.
0... The requirement does not apply to the product concerned.
x... Test was not required.

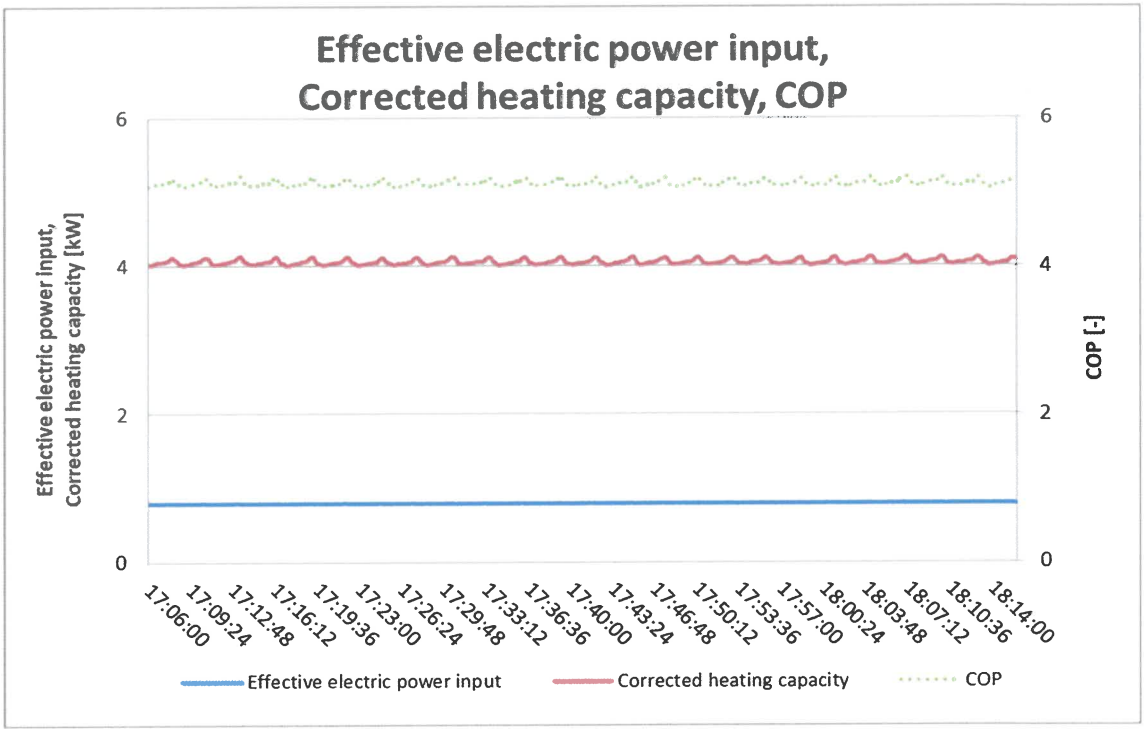
Tested by:	Ing. Jakub Čederle	Date:	2024-07-28	Signed:	Čederle
Reviewed and approved by:	Ing. Michal Faltýnek	Date:	2024-07-28	Signed:	Faltýnek

V. Graphs

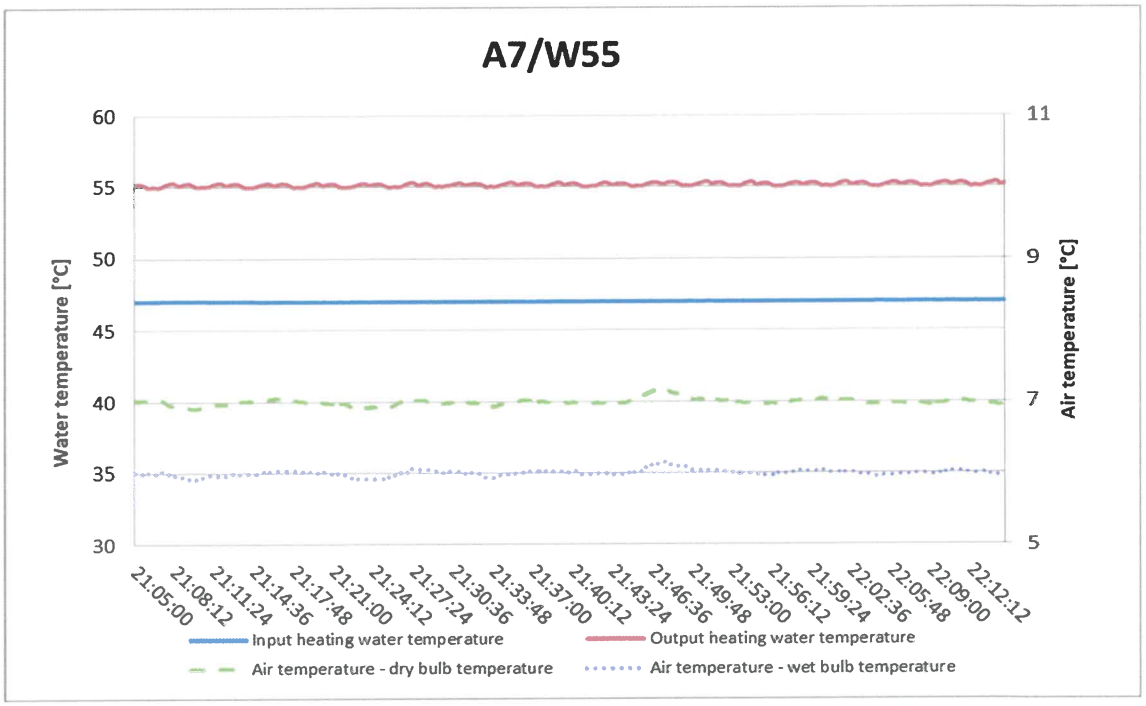
1. Rating conditions

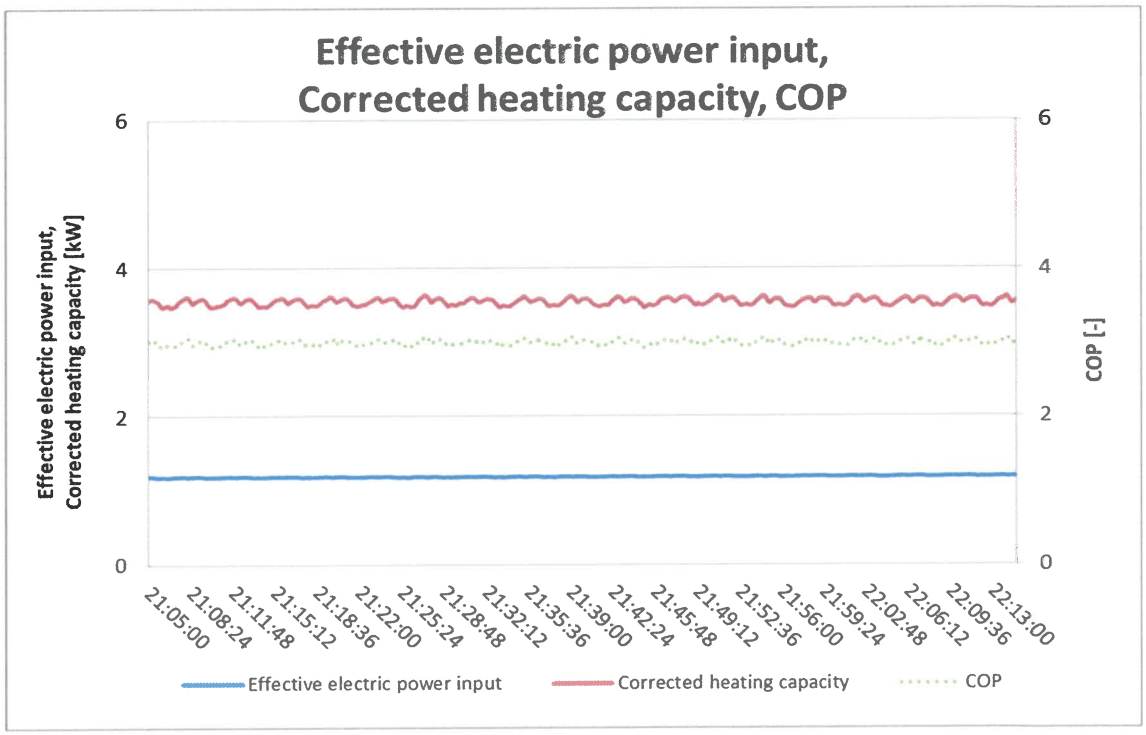
A7/W35 (36 Hz)





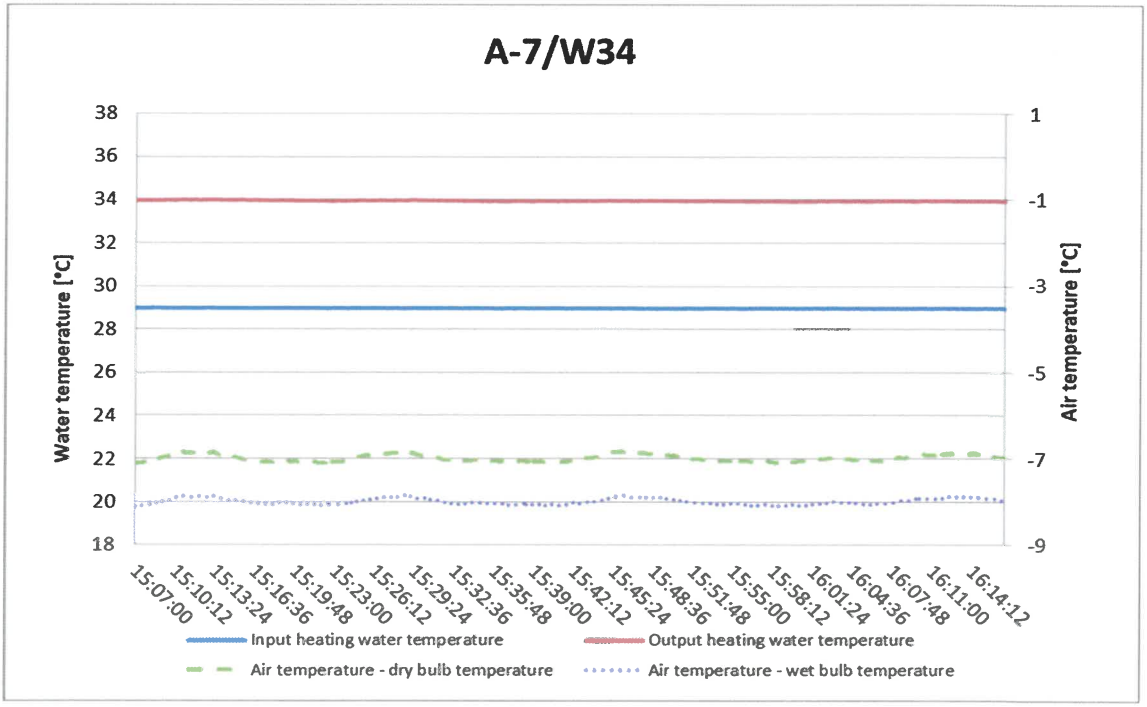
A7/W55 (36 Hz)

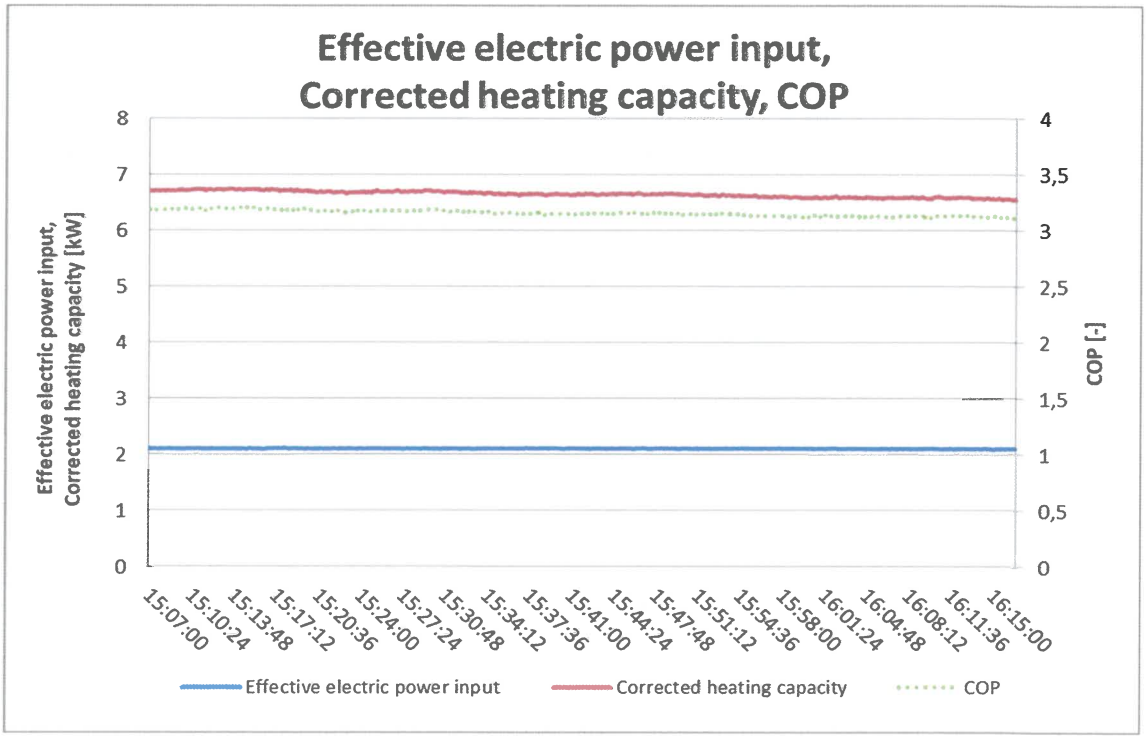

A7/W55
Water temperature [°C]
Air temperature [°C]
60
55
50
45
40
35
30
11
9
7
5
21:05:00
21:08:12
21:11:24
21:14:36
21:17:48
21:21:00
21:24:12
21:27:24
21:30:36
21:33:48
21:37:00
21:40:12
21:43:24
21:46:36
21:49:48
21:53:00
21:56:12
21:59:24
22:02:36
22:05:48
22:09:00
22:12:12
Input heating water temperature
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 [-]
6
4
2
0
21:05:00
21:08:24
21:11:48
21:15:12
21:18:36
21:22:00
21:25:24
21:28:48
21:32:12
21:35:36
21:39:00
21:42:24
21:45:48
21:49:12
21:52:36
21:56:00
21:59:24
22:02:48
22:06:12
22:09:36
22:13:00
Effective electric power input
Corrected heating capacity
COP

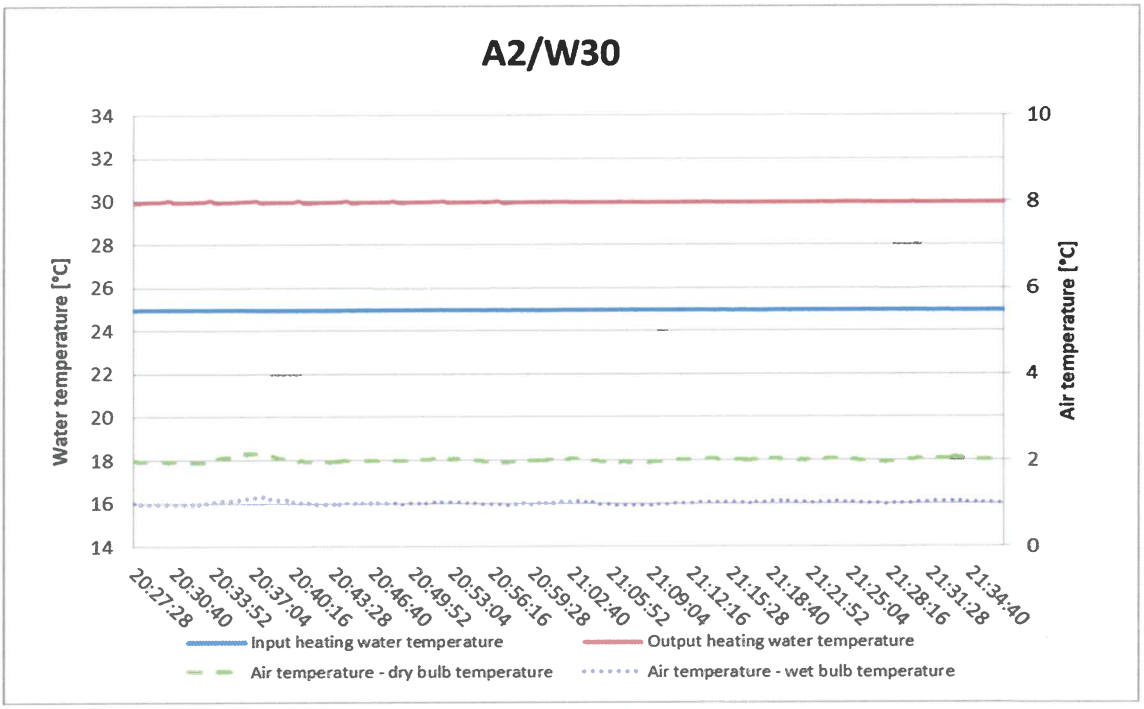
2. Seasonal performance tests and SCOP calculation – Low temperature application

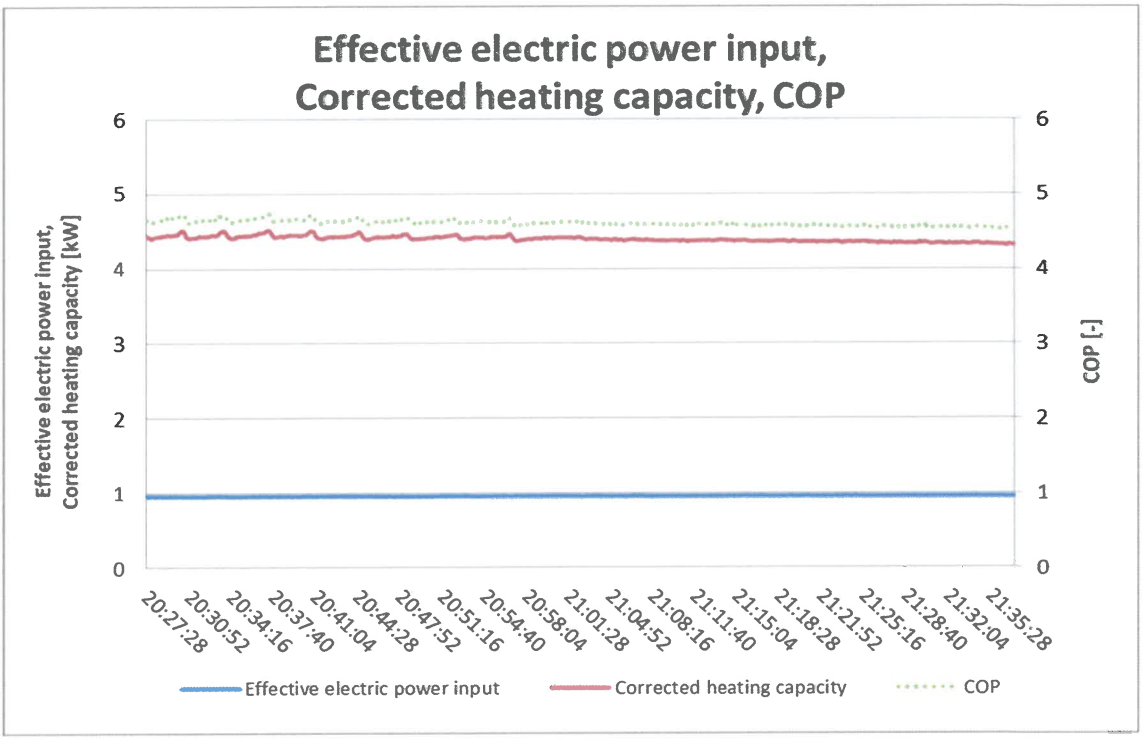
A-7/W34 (88 Hz)



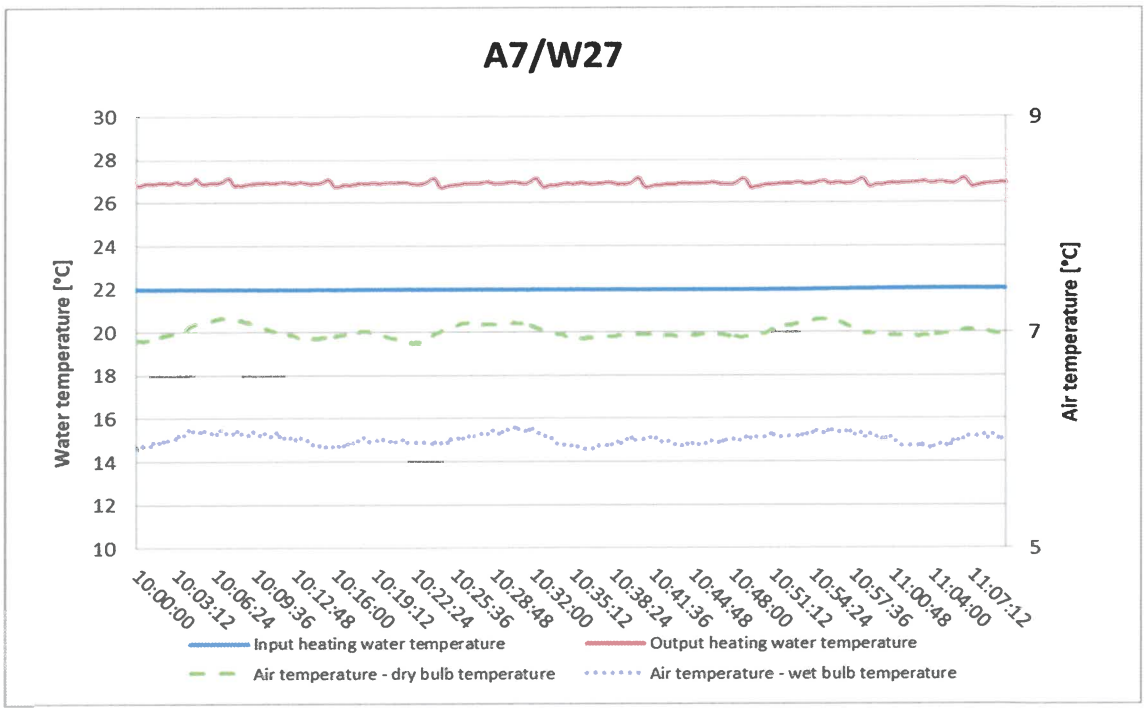


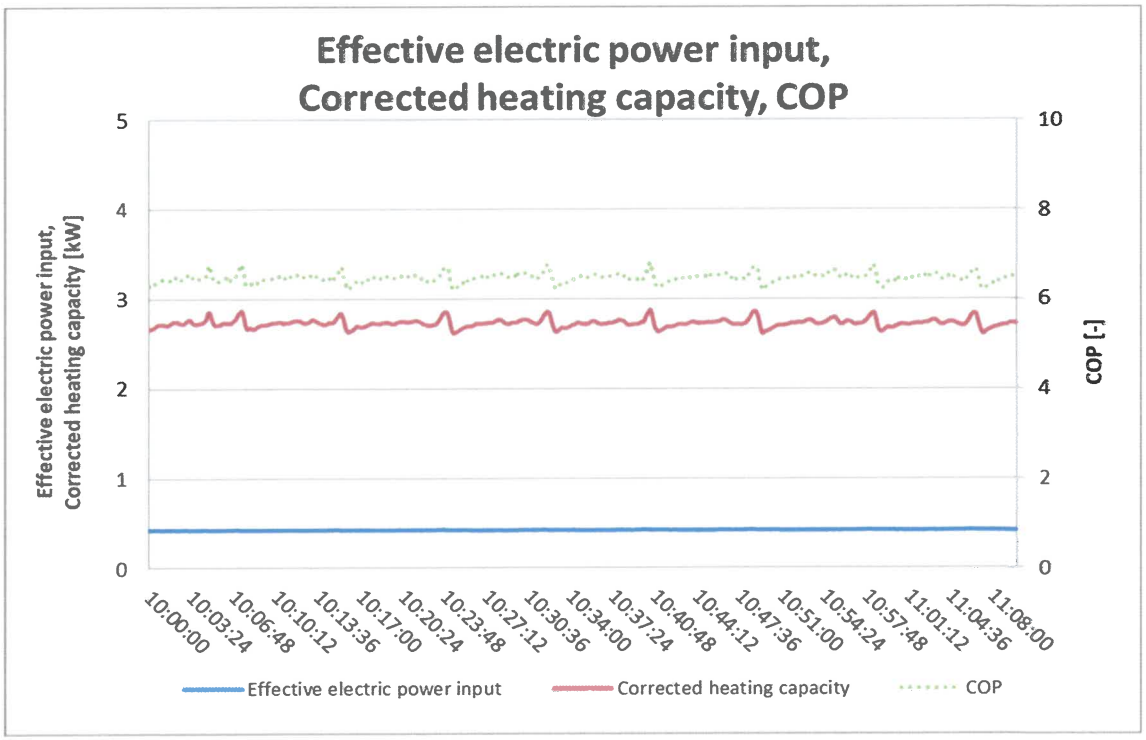
A2/W30 (40 Hz)


A2/W30
Water temperature [°C]
Air temperature [°C]
34
32
30
28
26
24
22
20
18
16
14
10
8
6
4
2
0
20:27:28
20:30:40
20:33:52
20:37:04
20:40:16
20:43:28
20:46:40
20:49:52
20:53:04
20:56:16
20:59:28
21:02:40
21:05:52
21:09:04
21:12:16
21:15:28
21:18:40
21:21:52
21:25:04
21:28:16
21:31:28
21:34:40
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

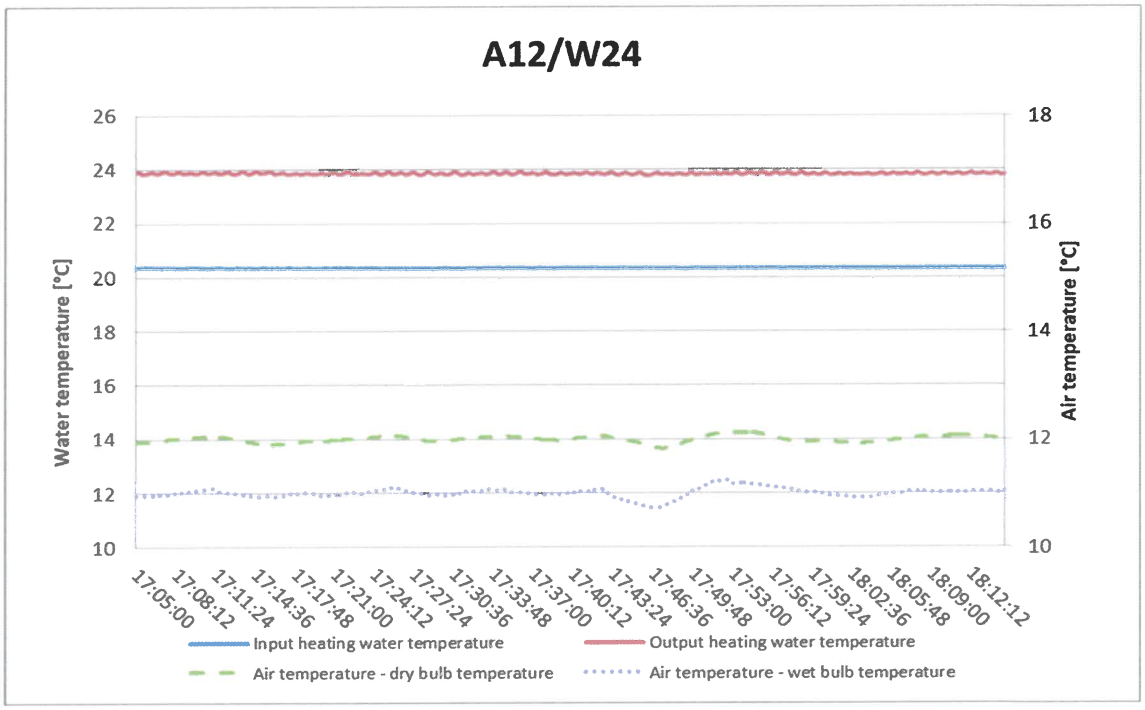

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
6
5
4
3
2
1
0
20:27:28
20:30:52
20:34:16
20:37:40
20:41:04
20:44:28
20:47:52
20:51:16
20:54:40
20:58:04
21:01:28
21:04:52
21:08:16
21:11:40
21:15:04
21:18:28
21:21:52
21:25:16
21:28:40
21:32:04
21:35:28
Effective electric power input
Corrected heating capacity
COP

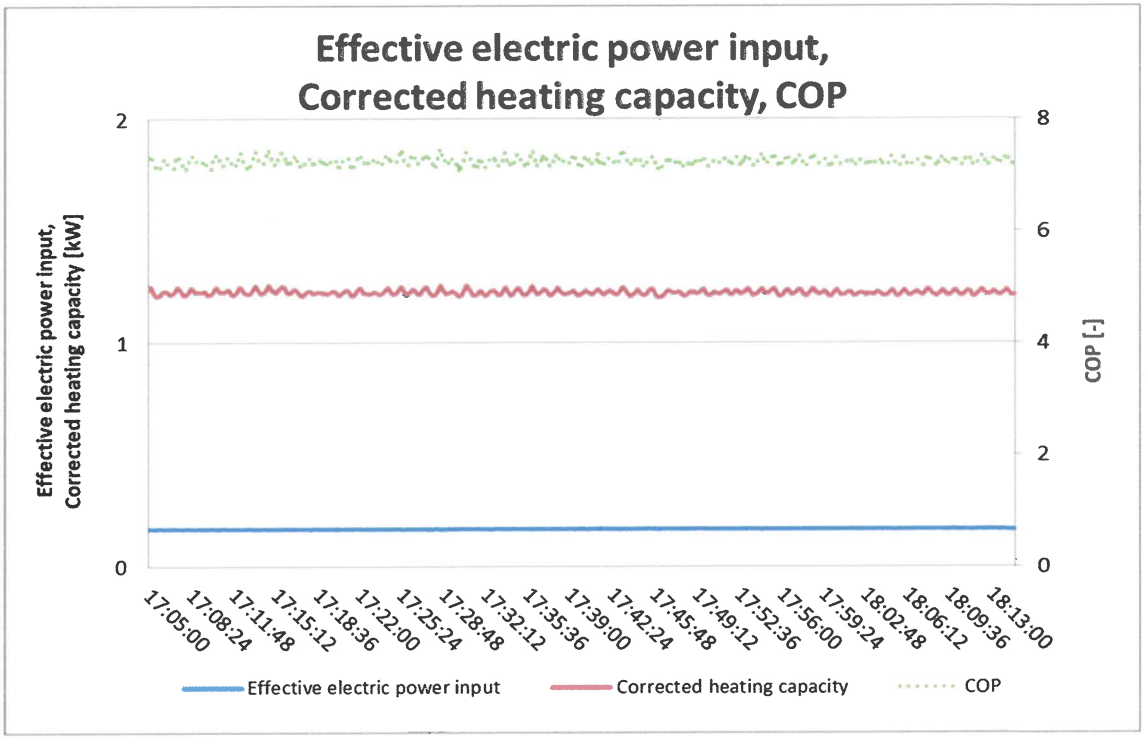
A7/W27 (23 Hz)


A7/W27
Water temperature [°C]
Air temperature [°C]
30
28
26
24
22
20
18
16
14
12
10
9
7
5
10:00:00
10:03:12
10:06:24
10:09:36
10:12:48
10:16:00
10:19:12
10:22:24
10:25:36
10:28:48
10:32:00
10:35:12
10:38:24
10:41:36
10:44:48
10:48:00
10:51:12
10:54:24
10:57:36
11:00:48
11:04:00
11:07:12
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

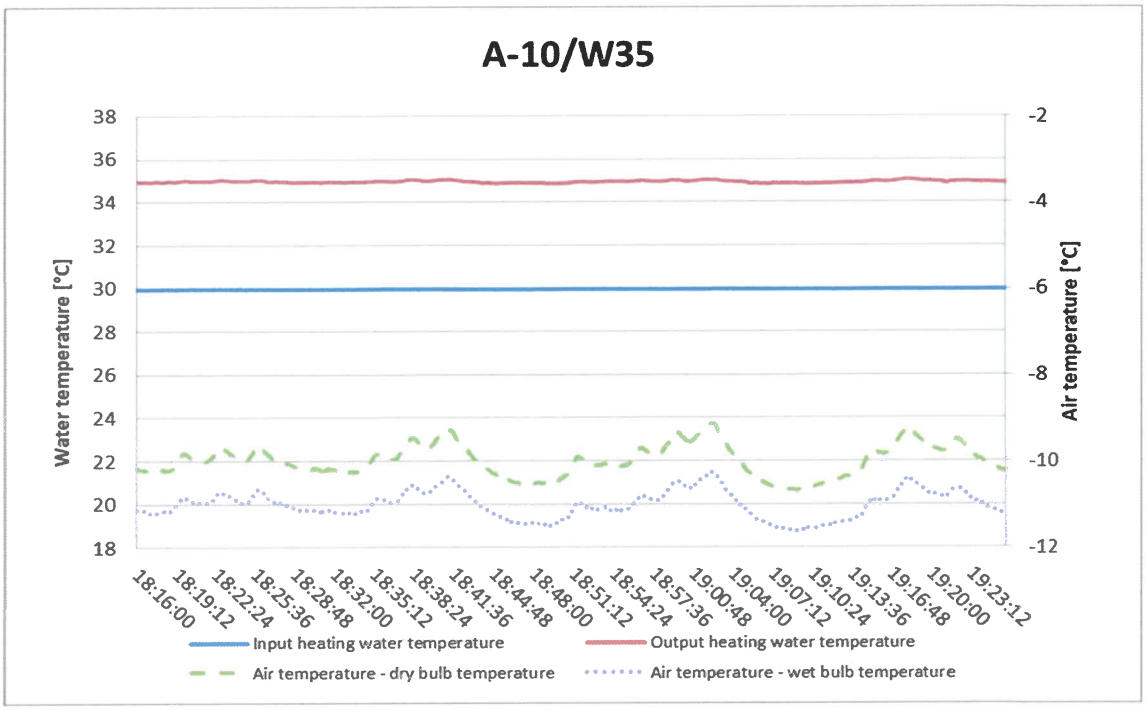

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
5
4
3
2
1
0
10
8
6
4
2
0
10:00:00
10:03:24
10:06:48
10:10:12
10:13:36
10:17:00
10:20:24
10:23:48
10:27:12
10:30:36
10:34:00
10:37:24
10:40:48
10:44:12
10:47:36
10:51:00
10:54:24
10:57:48
11:01:12
11:04:36
11:08:00
Effective electric power input
Corrected heating capacity
COP

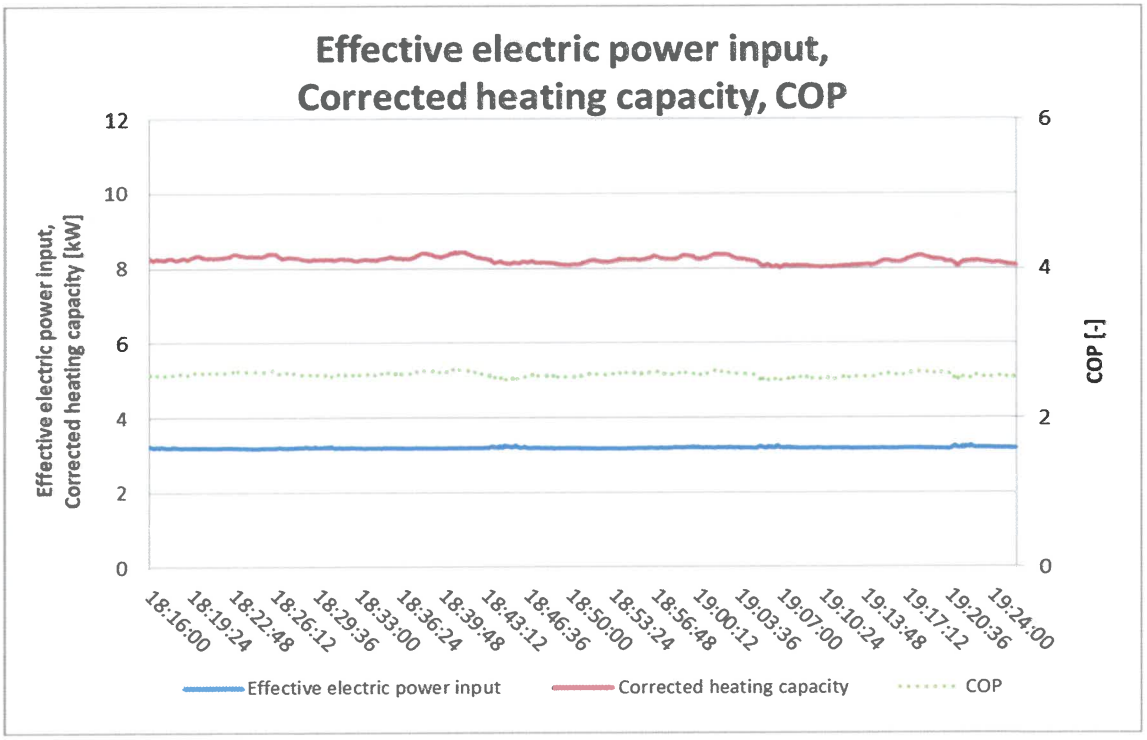
A12/W24 (9 Hz)


A12/W24
Water temperature [°C]
Air temperature [°C]
26
24
22
20
18
16
14
12
10
18
16
14
12
10
17:05:00
17:08:12
17:11:24
17:14:36
17:17:48
17:21:00
17:24:12
17:27:24
17:30:36
17:33:48
17:37:00
17:40:12
17:43:24
17:46:36
17:49:48
17:53:00
17:56:12
17:59:24
18:02:36
18:05:48
18:09:00
18:12:12
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 [-]
2
1
0
8
6
4
2
0
17:05:00
17:08:24
17:11:48
17:15:12
17:18:36
17:22:00
17:25:24
17:28:48
17:32:12
17:35:36
17:39:00
17:42:24
17:45:48
17:49:12
17:52:36
17:56:00
17:59:24
18:02:48
18:06:12
18:09:36
18:13:00
Effective electric power input
Corrected heating capacity
COP

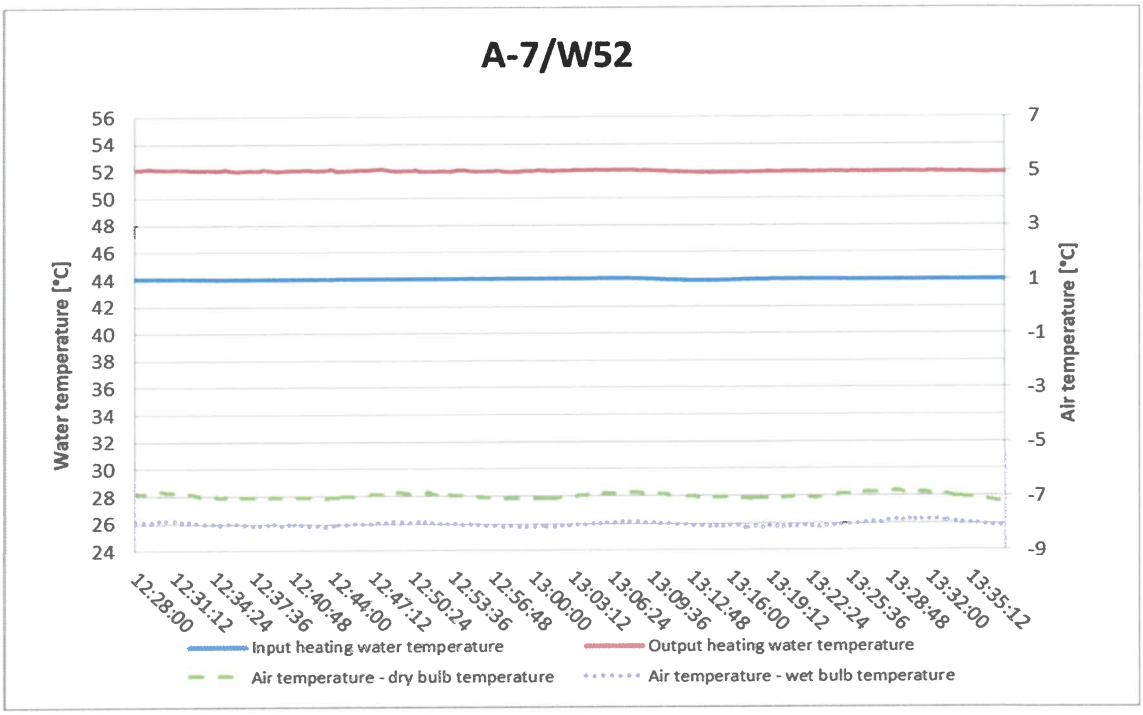
A-10/W35 (120 Hz)

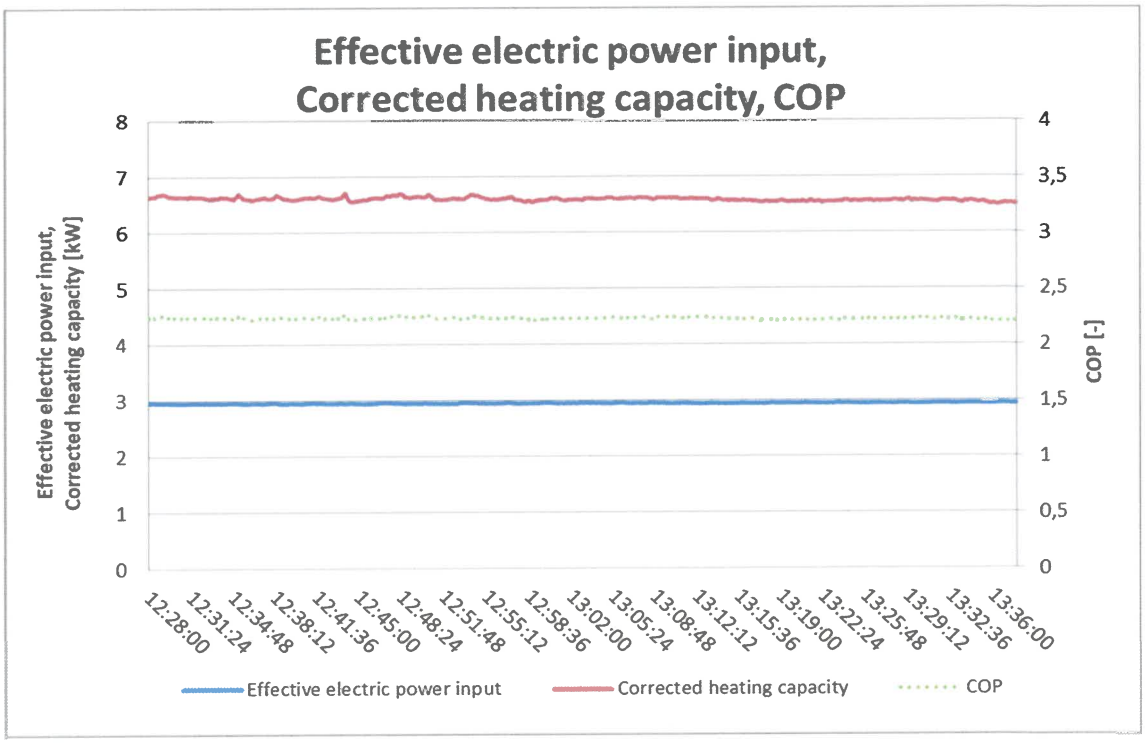




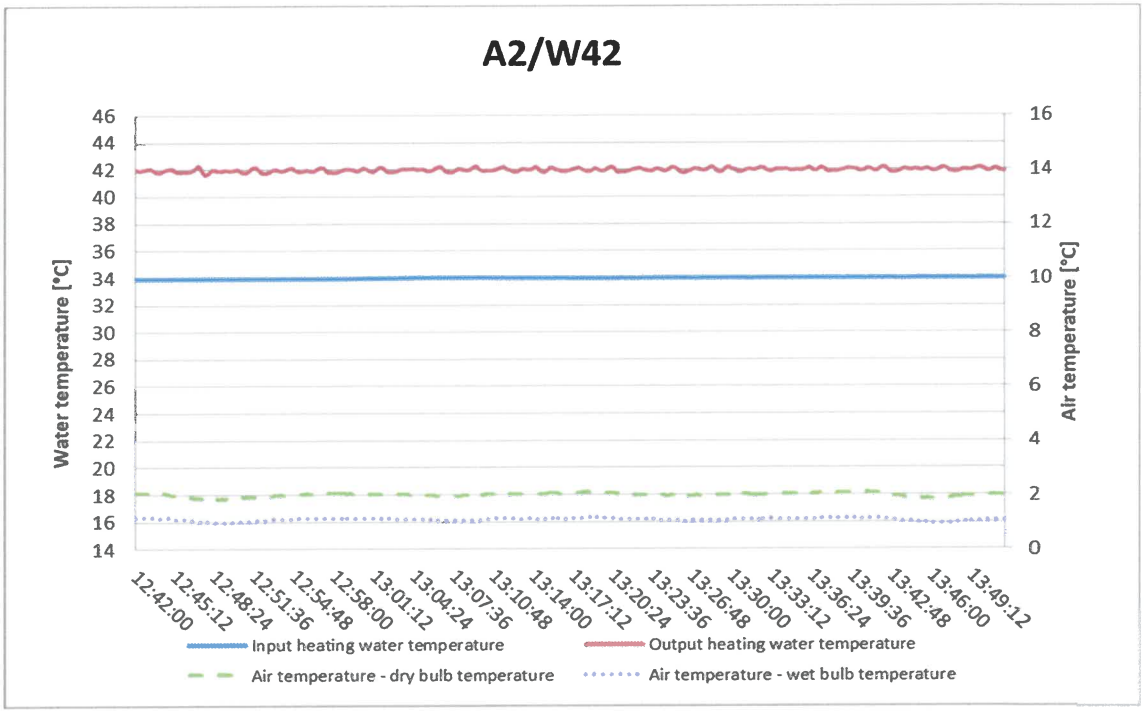
3. Seasonal performance tests and SCOP calculation – Medium temperature application

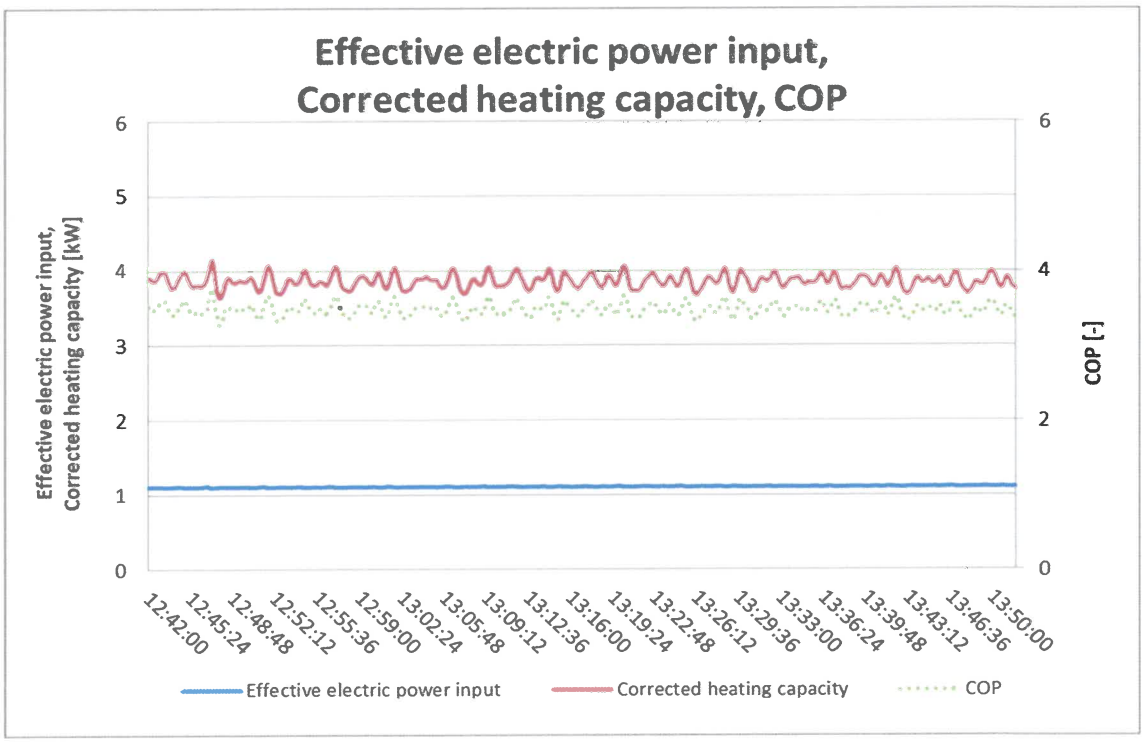
A-7/W52 (91 Hz)





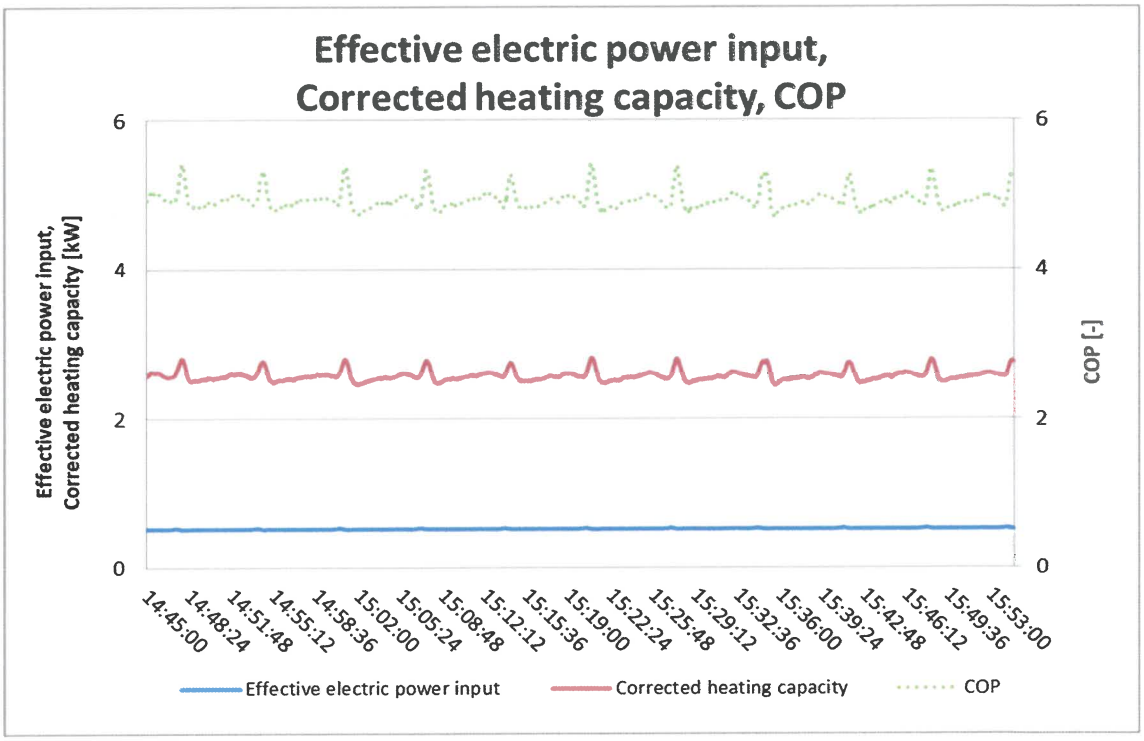
A2/W42 (40 Hz)


A2/W42
Water temperature [°C]
Air temperature [°C]
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

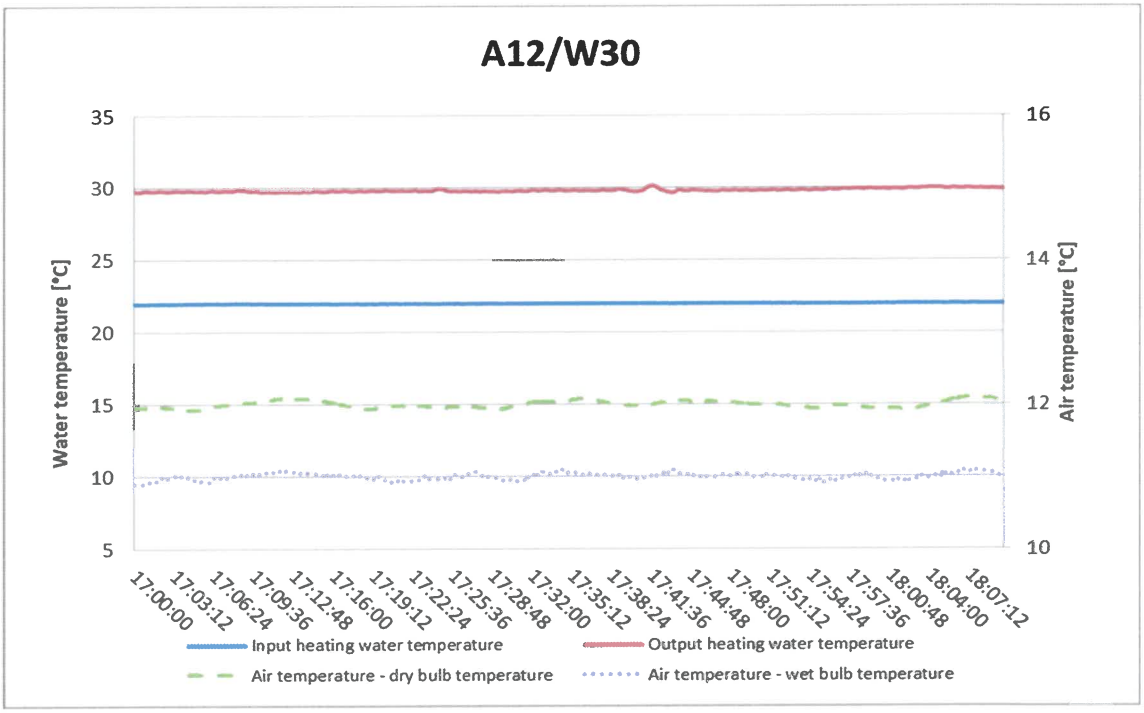

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
Effective electric power input
Corrected heating capacity
COP

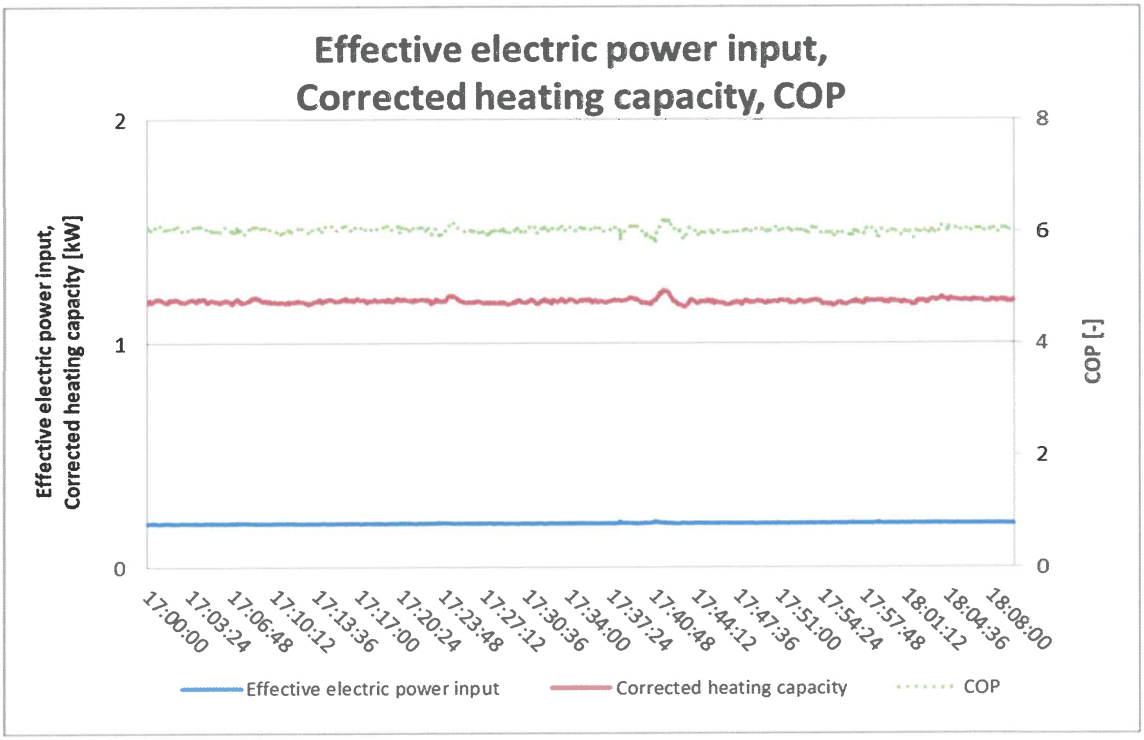
A7/W36 (23 Hz)


A7/W36
Water temperature [°C]
Air temperature [°C]
40
35
30
25
20
15
10
11
9
7
5
14:45:00
14:48:12
14:51:24
14:54:36
14:57:48
15:01:00
15:04:12
15:07:24
15:10:36
15:13:48
15:17:00
15:20:12
15:23:24
15:26:36
15:29:48
15:33:00
15:36:12
15:39:24
15:42:36
15:45:48
15:49:00
15:52:12
Input heating water temperature
Output heating water temperature
Air temperature - dry bulb temperature
Air temperature - wet bulb temperature

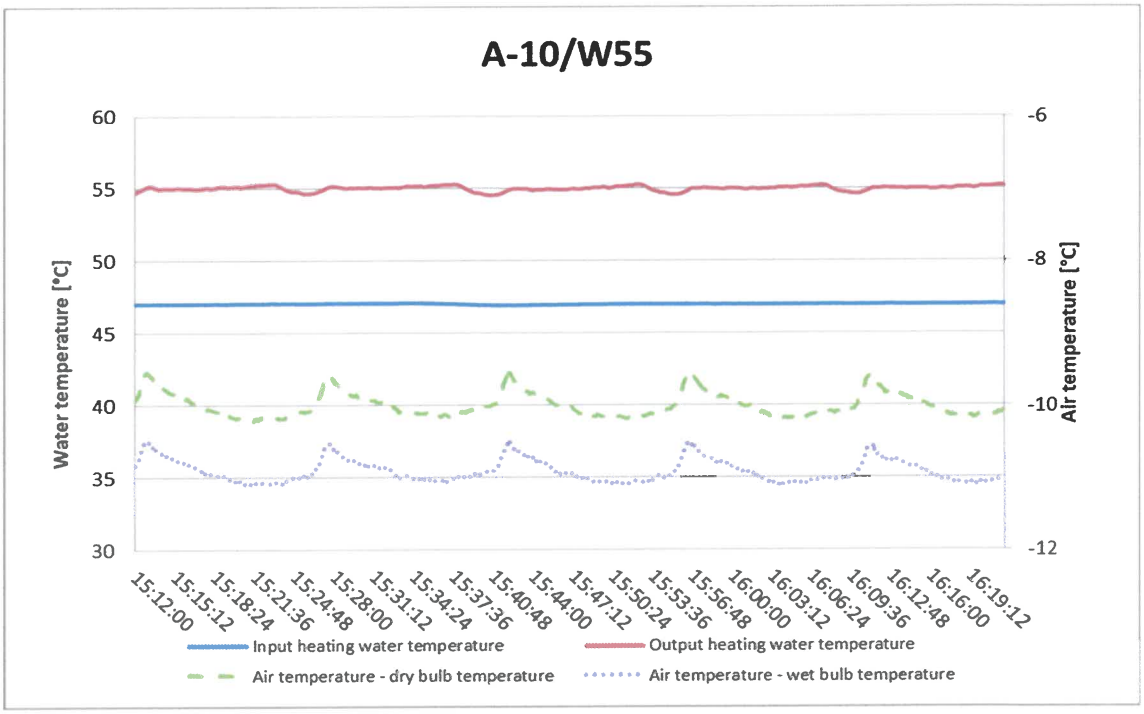

Effective electric power input,
Corrected heating capacity, COP
Effective electric power input, Corrected heating capacity [kW]
COP [-]
6
4
2
0
14:45:00
14:48:24
14:51:48
14:55:12
14:58:36
15:02:00
15:05:24
15:08:48
15:12:12
15:15:36
15:19:00
15:22:24
15:25:48
15:29:12
15:32:36
15:36:00
15:39:24
15:42:48
15:46:12
15:49:36
15:53:00
Effective electric power input
Corrected heating capacity
COP

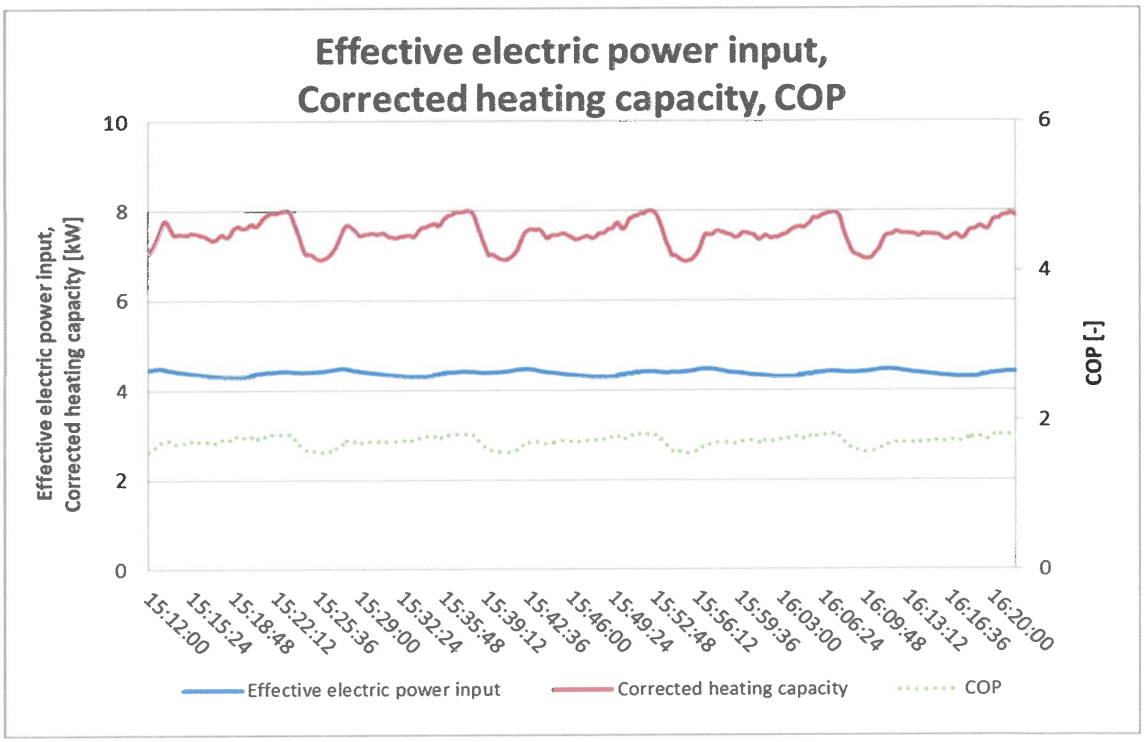
A12/W30 (9 Hz)


A12/W30
Water temperature [°C]
Air temperature [°C]
35
30
25
20
15
10
5
16
14
12
10
17:00:00
17:03:12
17:06:24
17:09:36
17:12:48
17:16:00
17:19:12
17:22:24
17:25:36
17:28:48
17:32:00
17:35:12
17:38:24
17:41:36
17:44:48
17:48:00
17:51:12
17:54:24
17:57:36
18:00:48
18:04:00
18:07:12
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 [-]
2
1
0
8
6
4
2
0
17:00:00
17:03:24
17:06:48
17:10:12
17:13:36
17:17:00
17:20:24
17:23:48
17:27:12
17:30:36
17:34:00
17:37:24
17:40:48
17:44:12
17:47:36
17:51:00
17:54:24
17:57:48
18:01:12
18:04:36
18:08:00
Effective electric power input
Corrected heating capacity
COP

A-10/W55 (120 Hz)





VI. A list of referenced documents

- Order of 2024-01-19 (Order reg. no. B-81256, received on 2024-01-25)
- Contract B-81256/32

- 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

Test Report compiled by: Ing. Jakub Čederle

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

– End of Test Report –

L 1045.1

TEST REPORT
32-11057/2/H

Product:	Outdoor Air/Water Heat pump - monobloc
Type designation:	**MultiTherma 12 HD**
Customer:	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Manufacturer:	IGLOO Sp. z o.o. Stary Wiśnicz 289 32-720 Nowy Wiśnicz POLAND
Report issue date:	2024-08-05
Distribution list:	1 copy to the Customer 1 copy to the Engineering Test Institute

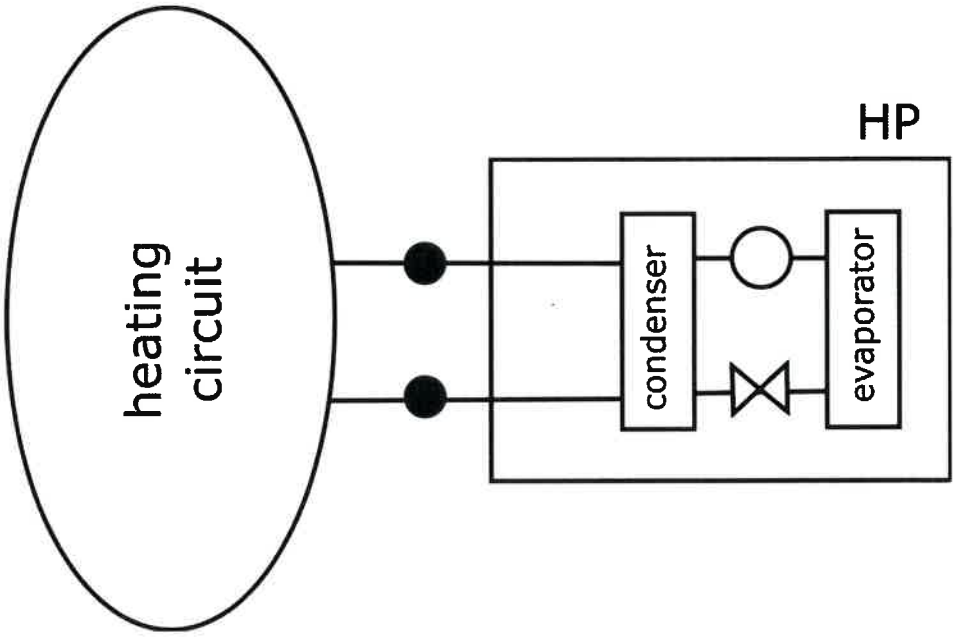
I. Description of product tested

The Heat pump **MultiTherma 12 HD** supplied by the company **IGLOO Sp. z o.o.** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outside and indoor electric box epn EP-LUX. Refrigerant R290 is used with charge 2 kg. Power supply is a three-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with variable flow rate.

Main components of the outdoor unit **MultiTherma 12 HD**:

- Serial number NS-077766
- Cubic shape with dimensions 1376 × 572 × 1270 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows, dimensions 1360 × 43,3 × 1186,5 mm (W × D × H), spacing 1.5 mm
- Plate condenser, dimensions 185 × 130 × 590 mm (W × D × H) including insulation
- Compressor Siam Compressor Industry APB33FAAMT
- Refrigerant R290 (2 kg)
- Liquid refrigerant separator Frigomec 05/S-S-34-ODS 18/12
- Liquid tank Frigomec RV-100X222
- 3x electric expansion valve Carel E2V11 FSBC1
- 4-way reversing valve Sanhua SHF-20D-67-02 with coil Sanhua
- 2x axial fan Ø 50 cm Ziehl-Abegg FN050-ZIA.OF.A5P4
- 2x pressure transmitter Danfoss MBS 3000
- 2x pressure switch Danfoss
- Liquid line filter drier Sanhua
- Temperature sensors
- Pressure sensors
- Refrigerant pipes

Scheme:



Photodocumentation:

Heat pump **MultiTherma 12 HD** – outdoor unit
– Front view –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Back view –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Compressor label –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Label –

Heat pump **MultiTherma 12 HD** – outdoor unit
– Without cover (side view)–

Heat pump **MultiTherma 12 HD** – outdoor unit
– Without cover (top view) –

II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.40178.001	**MultiTherma 12 HD**	2024-06-14

The visual inspection, tests and verification were carried out by Ing. Ondrej Bilkovič 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	E3.1
2.	Digital watt meter	1.2.3 ENERGIE ANALYZATOR_3
3.	Flow meter Krohne Optiflux	8.1.4 TECH_K3_V_DN15_PRIM 8.1.5 TECH_K3_V_DN15_SEK 8.1.6 TECH_K3_V_DN50_SEK 8.1.7 TECH_K3_V_DN80_PRIM
4.	Barometer	2.4 MAR18_1_PB
5.	Differential pressure gauge	14.2.1 MAR18_3_dP_1 14.2.2 MAR18_3_dP_2
6.	Thermometers	14.4 MAR18_T
7.	Thermo-hydro meter 608-H1	117043
8.	Tape measure	ME 475
9.	Multi-analyser SINUS SoundBook MK2	000-000-000-875/1
10.	Microphone pair G.R.A.S. 40 AK, wind deflector	000-000-000-875/2
11.	Calibrator G.R.A.S. 42AG	000-000-000-875/3

IV. Methods, results of tests and verifications

No.	Test objective	Requirement	Method of test	Documentation	Test evaluation/ verification *
1.	Calculation of sound power level	Art. 9	**ČSN ISO 9614-2:1997**	Page No. 8-13	+
2.	Acoustic measurements – Sound power level	Art. 8	**ČSN EN 12102-1:2023**	Page No. 7-13	+

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

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

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

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

Test objective:	Heating and cooling equipment
Exact name of the test procedure:	**2.136*** - Measurement of noise characteristics
Test method:	**ČSN EN 12102-1:2023; ČSN ISO 9614-2:1997**
Sample tested:	Air/Water Heat pump **MultiTherma 12 HD**
Measuring equipment used:	see Chapter III
Place of test:	Engineering Test Institute, Hudcova 424/56b, 621 00 Brno, CZ

Measurement uncertainty:

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

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

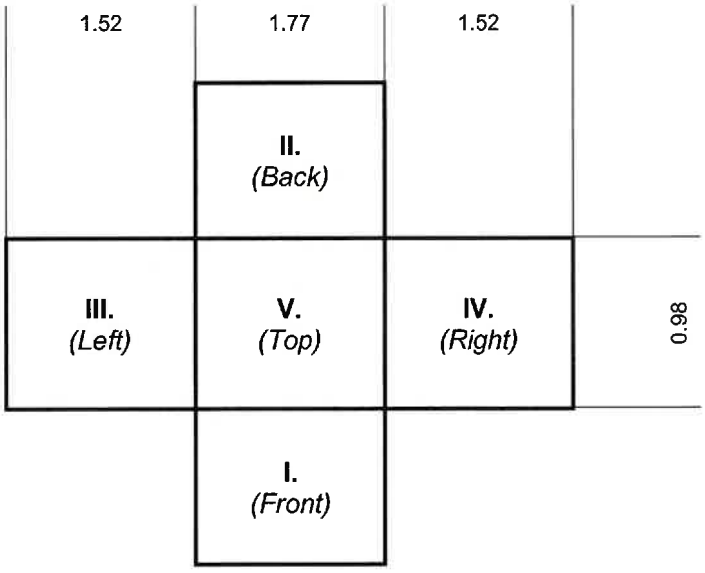
a) Measurement surface

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

Test Sample: Air/Water Heat pump **MultiTherma 12 HD**			
Distance from the test sample	*d*	[m]	0.20
Height of measurement surface	*h*	[m]	1.52
Width of measurement surface	*w*	[m]	1.77
Depth of measurement surface	*l*	[m]	0.98
Total measurement surface area	*S*	[m^2]	10.09
Minimal measuring time per surface	t_M	[s]	90.00

Sketch of measurement surface (not to scale):

Air/Water Heat pump **MultiTherma 12 HD**
– 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 adjusting the measurement distance and positions.

Climate-acoustic chamber *(corresponds to free field over a reflecting plane)*			
Width of testing room	l_1	[m]	6.95
Length of testing room	l_2	[m]	4.50
Height of testing room	l_3	[m]	3.60

c) Measured and calculated data – General overview:

Test sample			Air/Water Heat pump **MultiTherma 12 HD** - Outdoor unit -
The measured values are in accordance with ČSN EN 12102-1:2023			YES
The measured values are in accordance with ČSN EN ISO 9614-2:1997			YES
Operation mode			Heating
Specification of the assessment condition			A7/W55*
Type of HP capacity regulation			Inverter
Compressor speed settings			28 Hz
Fan speed settings			AUTO
Date of testing (YYYY-MM-DD)			2024-07-04
Reference air temperature	t_{amb}	[°C]	7.0
Relative humidity of air	RH	[%]	86.9
Ambient pressure	p_{amb}	[hPa]	978.1
Overall sound power level (linear)	L_W	[dB]	58.6 ± 1.5
Overall A-weighted sound power level	L_{WA}	**[dB(A)]**	**52.9 ± 1.5**
Accuracy class			**Engineering** **(grade 2)**

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

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

Air/Water Heat pump **MultiTherma 12 HD** Outdoor unit at A7/W55; Compressor at 28 Hz; Fan at AUTO	**Engineering (Grade 2)**

f_m	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_W	L_{WA}	U	Evaluation
[Hz]	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)}-L_{W(2)} \leq 5$		[dB]	[dB(A)]	[dB]	
125	28.0	9.6	YES	2.3	YES	YES	YES	53.3	37.8	± 3.0	c
250	28.2	3.0	YES	0.0	YES	YES	YES	53.1	44.8	± 2.0	passed
500	**20.6**	**2.6**	**YES**	**0.0**	**YES**	**YES**	**YES**	**54.4**	**51.2**	**± 1.5**	**passed**
1000	21.2	2.9	YES	0.0	YES	YES	YES	43.4	43.2	± 1.5	c
2000	22.1	2.6	YES	0.0	YES	YES	YES	35.6	36.7	± 1.5	c
4000	20.9	7.3	YES	0.0	YES	YES	YES	29.3	30.2	± 1.5	c
8000**)	20.5	9.9	YES	1.0	YES	NO	NO	23.1	23.0	± 2.5	nc
Total								**58.6**	**52.9**	**± 1.5**	

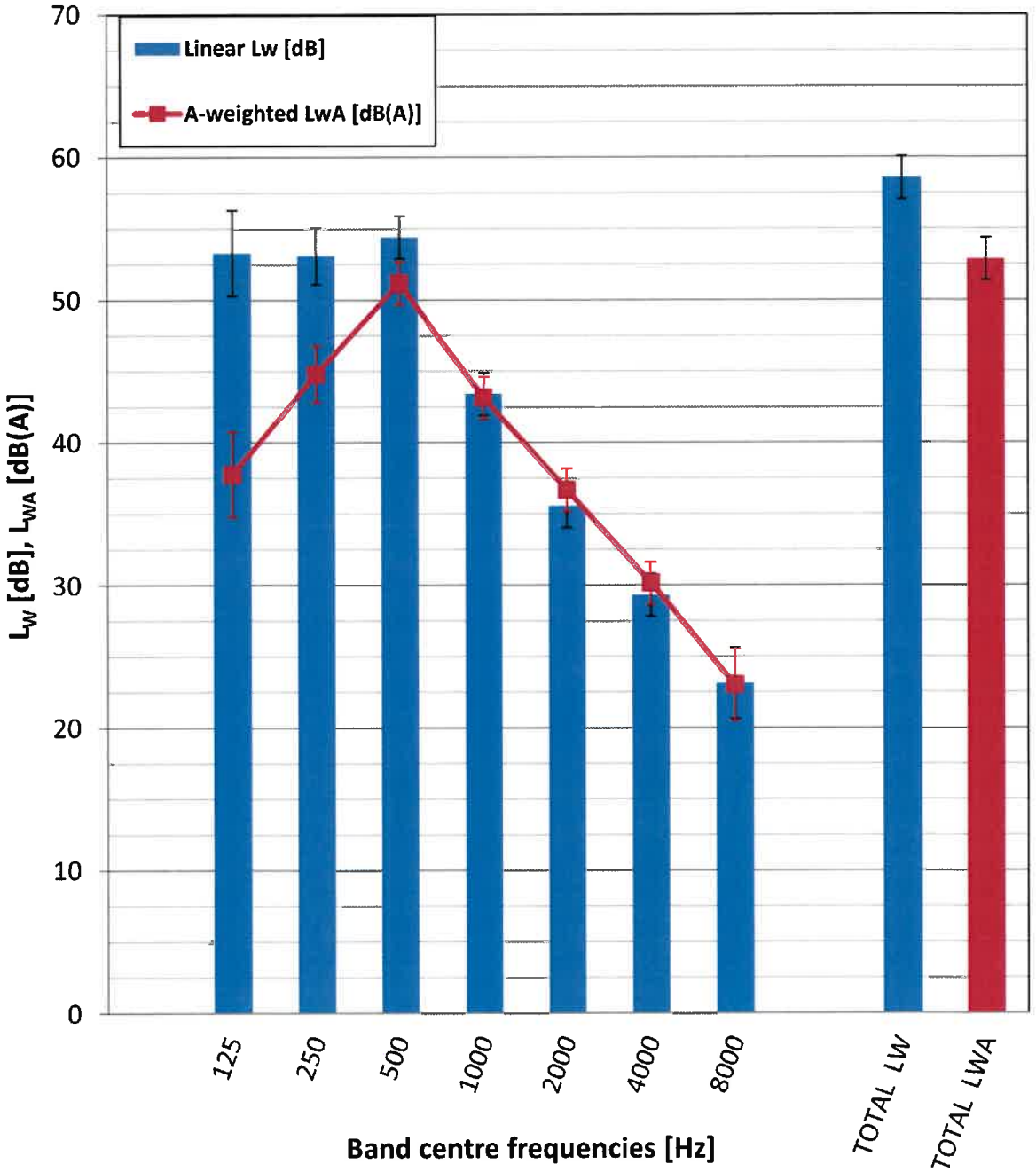
**) *Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.*

Legend:

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

Spectrum of Sound power level L_W – octave bands

Air/Water Heat pump **MultiTherma 12 HD** Outdoor unit at A7/W55; Compressor at 28 Hz; Fan at AUTO	**Engineering** **(Grade 2)**



1B) **Measurement results** – one-third octave bands

Air/Water Heat pump **MultiTherma 12 HD** Outdoor unit at A7/W55; Compressor at 28 Hz; Fan at AUTO	**Engineering** **(Grade 2)**

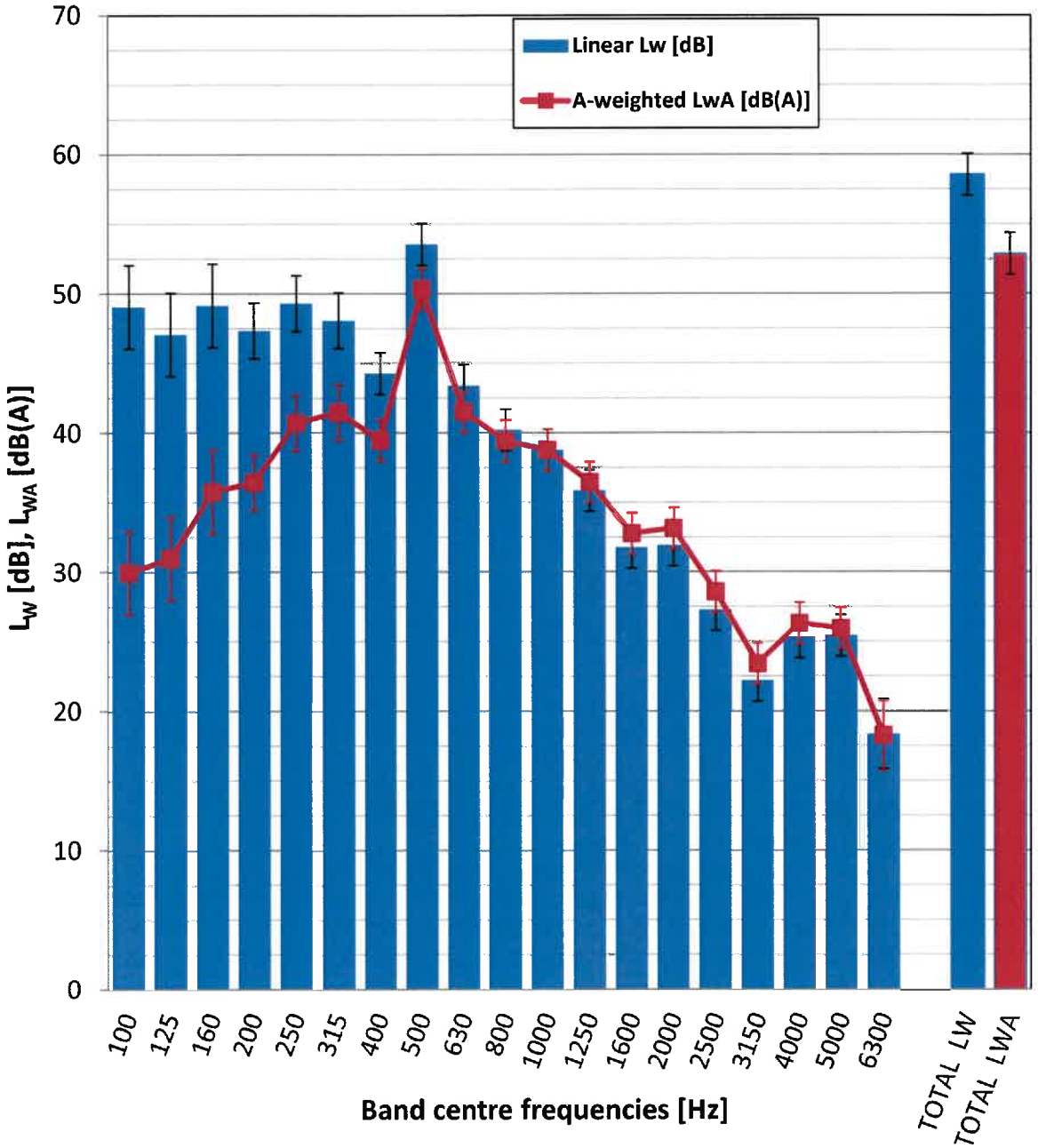
f_m	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_W	L_{WA}	U	Evaluation
[Hz]	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{w(1)}-L_{w(2)} \leq s$		[dB]	[dB(A)]	[dB]	
100	20.6	6.4	YES	0.0	YES	YES	YES	49.0	29.9	± 3.0	c
125	28.0	9.6	YES	2.3	YES	YES	YES	47.1	31.0	± 3.0	c
160	27.7	5.9	YES	2.3	YES	YES	YES	49.2	35.8	± 3.0	c
200	28.5	2.9	YES	0.0	YES	YES	YES	47.3	36.4	± 2.0	c
250	28.2	3.0	YES	0.0	YES	YES	YES	49.3	40.7	± 2.0	passed
315	28.5	2.5	YES	0.0	YES	YES	YES	48.1	41.5	± 2.0	passed
400	29.2	3.1	YES	0.0	YES	YES	YES	44.3	39.5	± 1.5	c
500	**20.6**	**2.6**	**YES**	**0.0**	**YES**	**YES**	**YES**	**53.5**	**50.3**	**± 1.5**	**passed**
630	20.9	2.9	YES	0.0	YES	YES	YES	43.4	41.5	± 1.5	passed
800	28.4	3.0	YES	0.0	YES	YES	YES	40.2	39.4	± 1.5	c
1000	21.2	2.9	YES	0.0	YES	YES	YES	38.8	38.8	± 1.5	c
1250	21.5	3.3	YES	0.0	YES	YES	YES	35.9	36.5	± 1.5	c
1600	21.1	3.2	YES	0.0	YES	YES	YES	31.8	32.8	± 1.5	c
2000	22.1	2.6	YES	0.0	YES	YES	YES	31.9	33.1	± 1.5	c
2500	21.8	3.6	YES	0.0	YES	YES	YES	27.3	28.6	± 1.5	c
3150	21.2	5.5	YES	0.0	YES	NO	NO	22.2	23.4	± 1.5	nc
4000	20.9	7.3	YES	0.0	YES	YES	YES	25.3	26.3	± 1.5	c
5000	20.3	5.0	YES	0.0	YES	YES	YES	25.4	25.9	± 1.5	c
6300	20.5	9.9	YES	1.0	YES	NO	NO	18.4	18.3	± 2.5	nc
Total								**58.6**	**52.9**	**± 1.5**	

Legend:

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

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

Air/Water Heat pump **MultiTherma 12 HD** Outdoor unit at A7/W55; Compressor at 28 Hz; Fan at AUTO	**Engineering** **(Grade 2)**



Tested by: Ing. Ondrej Bilkovič Date: 2024-08-05 Signed:

Reviewed and approved by: Ing. Antonín Kolbábek, Ph.D. Date: 2024-08-05 Signed:

V. A list of referenced documents

- Order of 2024-01-19 (Order reg. no. B-81256, received on 2024-01-25)
- Contract B-81256/32

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

- ČSN EN 14511-2:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 2: Test conditions
- ČSN EN 14511-3:2023 - 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 SZU task no. 32-11057
- Record measurement file 32-11057-H.zip

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

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

– End of Test Report –

Pompa ciepła MultiTherma, typ: powietrze – woda		
Podtyp: MultiTherma 12 HD		
Model 1	MultiTherma 12 HD	Jednostka zewnętrzna 12
Model 2	MultiTherma 12 HD + ElectroBox	Jednostka zewnętrzna 12 z elektryczną jednostką wewnętrzną stosowaną do sterowania jednostkami zewnętrznymi
Model 3	MultiTherma 12 HD + MultiTherma BASIC 5-15	Jednostka zewnętrzna 12 zestaw z jednostką wewnętrzną typu BASIC (bez grzałki)
Model 4	MultiTherma 12 HD + MultiTherma BASIC 16-25	Jednostka zewnętrzna 12 zestaw z jednostką wewnętrzną typu BASIC (bez grzałki) i mocniejszą pompą
Model 5	MultiTherma 12 HD + MultiTherma PRO 5-15	Jednostka zewnętrzna 12 zestaw z jednostką wewnętrzną typu PRO (z grzałką i sprzęgłem hydraulicznym)
Model 6	MultiTherma 12 HD + MultiTherma PRO 16-25	Jednostka zewnętrzna 12 zestaw z jednostką wewnętrzną typu PRO (z grzałką i sprzęgłem hydraulicznym) i mocniejszą pompą
Model 7	MultiTherma 12 Cascade	Jednostka zewnętrzna 12 w zestawie z pompą obiegową
Model 8	MultiTherma 12 HD Cascade + ElectroBox	Jednostka zewnętrzna 12 w zestawie z pompą obiegową i elektryczną jednostką wewnętrzną stosowaną do sterowania jednostkami zewnętrznymi
Model 9	MultiTherma 12 HD Cascade + MultiTherma BASIC 5-15	Jednostka zewnętrzna 12 w zestawie z pompą obiegową i jednostką wewnętrzną typu BASIC (bez grzałki)
Model 10	MultiTherma 12 HD Cascade + MultiTherma BASIC 16-25	Jednostka zewnętrzna 12 w zestawie z pompą obiegową i jednostką wewnętrzną typu BASIC (bez grzałki) i mocniejszą pompą
Model 11	MultiTherma 12 HD Cascade + MultiTherma PRO 5-15	Jednostka zewnętrzna 12 w zestawie z pompą obiegową i jednostką wewnętrzna typu PRO (z grzałką i sprzęgłem hydraulicznym)
Model 12	MultiTherma 12 HD Cascade + MultiTherma PRO 16-25	Jednostka zewnętrzna 12 w zestawie z pompą obiegową i jednostką wewnętrzna typu PRO (z grzałką i sprzęgłem hydraulicznym) i mocniejszą pompą

OŚWIADCZENIE

Producent **IGLOO Sp. z o.o.** oświadcza, iż pompy ciepła

1) MultiTherma 12 HD
   Oznaczenie/typ/identyfikator modelu
2) MultiTherma 12 HD + ElectroBox
   Oznaczenie/typ/identyfikator modelu
3) MultiTherma 12 HD + MultiTherma BASIC 5-15
   Oznaczenie/typ/identyfikator modelu
4) MultiTherma 12 HD + MultiTherma BASIC 16-25
   Oznaczenie/typ/identyfikator modelu
5) MultiTherma 12 HD + MultiTherma PRO 5-15
   Oznaczenie/typ/identyfikator modelu
6) MultiTherma 12 HD + MultiTherma PRO 16-25
   Oznaczenie/typ/identyfikator modelu
7) MultiTherma 12 HD Cascade
   Oznaczenie/typ/identyfikator modelu
8) MultiTherma 12 HD Cascade + ElectroBox
   Oznaczenie/typ/identyfikator modelu
9) MultiTherma 12 HD Cascade + MultiTherma BASIC 5-15
   Oznaczenie/typ/identyfikator modelu
10) MultiTherma 12 HD Cascade + MultiTherma BASIC 16-25
    Oznaczenie/typ/identyfikator modelu
11) MultiTherma 12 HD Cascade + MultiTherma PRO 5-15
    Oznaczenie/typ/identyfikator modelu
12) MultiTherma 12 HD Cascade + MultiTherma PRO 16-25
    Oznaczenie/typ/identyfikator modelu

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

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

Stary Wiśnicz, 19.11.2024r.
Miejscowość, data

Prezes Zarządu
Robert Bialik
Podpis osoby upoważnionej

IGLOO
SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ
Stary Wiśnicz nr 280, 32-720 Nowy Wiśnicz
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info@igloo.pl tel: +48 14 662 19 10
S. R. dla Krakowa-Śródmieścia w Krakowie XII Wydział Gospodarczy KRS, Kapitał zakładowy 7.500.000,zł

Pompa ciepła MultiTherma, typ: powietrze – woda		
Podtyp: MultiTherma 17 HD		
Model 1	MultiTherma 17 HD	Jednostka zewnętrzna 17
Model 2	MultiTherma 17 HD + ElectroBox	Jednostka zewnętrzna 17 z elektryczną jednostką wewnętrzną stosowaną do sterowania jednostkami zewnętrznymi
Model 3	MultiTherma 17 HD + MultiTherma BASIC 16-25	Jednostka zewnętrzna 17 zestaw z jednostką wewnętrzną typu BASIC (bez grzałki)
Model 4	MultiTherma 17 HD + MultiTherma PRO 16-25	Jednostka zewnętrzna 17 zestaw z jednostką wewnętrzną typu PRO (z grzałką i sprzęgłem hydraulicznym)
Model 5	MultiTherma 17 HD Cascade	Jednostka zewnętrzna 17 w zestawie z pompą obiegową
Model 6	MultiTherma 17 HD Cascade + ElectroBox	Jednostka zewnętrzna 17 w zestawie z pompą obiegową i elektryczną jednostką wewnętrzną stosowaną do sterowania jednostkami zewnętrznymi
Model 7	MultiTherma 17 HD Cascade + MultiTherma BASIC 16-25	Jednostka zewnętrzna 17 w zestawie z pompą obiegową i jednostką wewnętrzną typu BASIC (bez grzałki)
Model 8	MultiTherma 17 HD Cascade + MultiTherma PRO 16-25	Jednostka zewnętrzna 17 w zestawie z pompa obiegową i jednostką wewnętrzną typu PRO (z grzałką i sprzęgłem hydraulicznym)

OŚWIADCZENIE

Producent **IGLOO Sp. z o.o.** oświadcza, iż pompy ciepła

1) MultiTherma 17 HD
   Oznaczenie/typ/identyfikator modelu
2) MultiTherma 17 HD + ElectroBox
   Oznaczenie/typ/identyfikator modelu
3) MultiTherma 17 HD + MultiTherma BASIC 16-25
   Oznaczenie/typ/identyfikator modelu
4) MultiTherma 17 HD + MultiTherma PRO 16-25
   Oznaczenie/typ/identyfikator modelu
5) MultiTherma 17 HD Cascade
   Oznaczenie/typ/identyfikator modelu
6) MultiTherma 17 HD Cascade + ElectroBox
   Oznaczenie/typ/identyfikator modelu
7) MultiTherma 17 HD Cascade + MultiTherma BASIC 16-25
   Oznaczenie/typ/identyfikator modelu
8) MultiTherma 17 HD Cascade + MultiTherma PRO 16-25
   Oznaczenie/typ/identyfikator modelu

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

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

Stary Wiśnicz, 13.11.2024 r.
Miejscowość, data

Prezes Zarządu
Robert Bialik
Podpis osoby upoważnionej

IGLOO
SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ
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Gospodarczy KRS, Kapitał zakładowy 7.500.000,00 zł
(17)

Pompa ciepła MultiTherma, typ: powietrze – woda		
Podtyp: MultiTherma 21 HD		
Model 1	MultiTherma 21 HD	Jednostka zewnętrzna 21
Model 2	MultiTherma 21 HD + ElectroBox	Jednostka zewnętrzna 21 z elektryczną jednostką wewnętrzną stosowaną do sterowania jednostkami zewnętrznymi
Model 3	MultiTherma 21 HD + MultiTherma BASIC 16-25	Jednostka zewnętrzna 21 zestaw z jednostką wewnętrzną typu BASIC (bez grzałki)
Model 4	MultiTherma 21 HD + MultiTherma PRO 16-25	Jednostka zewnętrzna 21 zestaw z jednostką wewnętrzną typu PRO (z grzałką i sprzęgłem hydraulicznym)
Model 5	MultiTherma 21 HD Cascade	Jednostka zewnętrzna 21 w zestawie z pompą obiegową
Model 6	MultiTherma 21 HD Cascade + ElectroBox	Jednostka zewnętrzna 21 w zestawie z pompą obiegową i elektryczną jednostką wewnętrzną stosowaną do sterowania jednostkami zewnętrznymi
Model 7	MultiTherma 21 HD Cascade + MultiTherma BASIC 16-25	Jednostka zewnętrzna 21 w zestawie z pompą obiegową i jednostką wewnętrzną typu BASIC (bez grzałki)
Model 8	MultiTherma 21 HD Cascade + MultiTherma PRO 16-25	Jednostka zewnętrzna 21 w zestawie z pompą obiegową i jednostką wewnętrzną typu PRO (z grzałką i sprzęgłem hydraulicznym)

OŚWIADCZENIE

Producent **IGLOO Sp. z o.o.** oświadcza, iż pompy ciepła

1) MultiTherma 21 HD
   Oznaczenie/typ/identyfikator modelu
2) MultiTherma 21 HD + ElectroBox
   Oznaczenie/typ/identyfikator modelu
3) MultiTherma 21 HD + MultiTherma BASIC 16-25
   Oznaczenie/typ/identyfikator modelu
4) MultiTherma 21 HD + MultiTherma PRO 16-25
   Oznaczenie/typ/identyfikator modelu
5) MultiTherma 21 HD Cascade
   Oznaczenie/typ/identyfikator modelu
6) MultiTherma 21 HD Cascade + ElectroBox
   Oznaczenie/typ/identyfikator modelu
7) MultiTherma 21 HD Cascade + MultiTherma BASIC 16-25
   Oznaczenie/typ/identyfikator modelu
8) MultiTherma 21 HD Cascade + MultiTherma PRO 16-25
   Oznaczenie/typ/identyfikator modelu

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

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

Stary Wiśnicz, 13.11.2024.
Miejscowość, data

Prezes Zarządu
Robert Bialik
Podpis osoby upoważnionej

IGLOO
SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ
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Gospodarczy KRS, Kapitał zakładowy 7.500.000 zł
(17)