

Logo: Strojirensky zkušební ústav, s.p., Bmo, Česká republika Engineering Test Institute, Public Enterprise, Bmo, Czech Republic /Instituf  
badań technicznych, Przedsiębiorstwo publiczne, Bmo, Republika Czeska/

# CERTYFIKAT BADAŃ

Nr O-B-00133-24

Klient SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz POLSKA

Produkt Zewnętrzna pompa ciepła powietrze/woda - monoblok

Oznaczenie typu / znak towarowy NEXUS M17 PRO

Metody badań ČSN EN 14511-2:2023, ČSN EN 14511-3:2023,  
ČSN EN 14825:2023, ČSN EN 12102: 2023, Przepisy dotyczące badań EHPA -  
Badanie pomp ciepła powietrze/woda, wersja 2.4a

Podstawa certyfikatu Raporty z badań:  
39-17312/T z dnia 2024-01-30 r.  
39-17312/H z dnia 2023-10-25 r.  
Dokumentacja techniczna SUNEX S.A.

Zastosowanie temperatury NISKA TEMPERATURA,  
(Referencyjna temperatura wody 35 °C)

ŚREDNIA TEMPERATURA  
(Referencyjna temperatura wody 55 °C)

Warunki temperaturowe*	A7/W35	A7/W55
Skorygowana pojemność cieplna [kW]	16.708	15.798
Efektywna moc elektryczna [kW]	3.956	5.386
Współczynnik wydajności [-]	4.223	2.933
Ustawienia sprężarki [rps]	95	95

(\*) Komentarz do skróconego oznaczenia: np. A7/W35

A (powietrze), 7 (powietrze wejściowe - temperatura termometru suchego w °C) / W (woda), 35 (wyjściowa temperatura wody grzewczej  
(chłodzącej) w °C).

O-B-00133-24, strona 1 (2)

/pieczęć i stopka z danymi adresowymi/



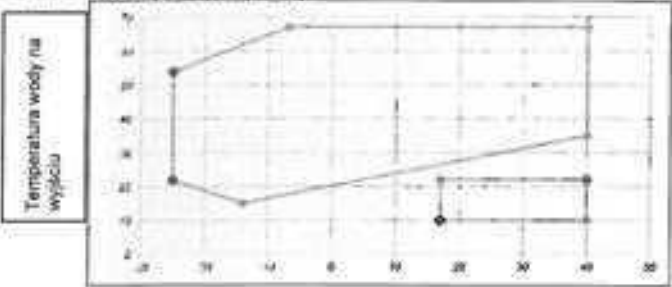
2024-03-25, 14:30

Poziom mocy akustycznej w warunkach temperatury A7/W55" (przy 24%):

Pompa ciepła powietrze/woda - split	NEXUS M14 PRO	- jednostka zewnętrzna -	- jednostka wewnętrzna -
Poziom mocy akustycznej	LwA 57,9 ± 1,5 dB(A)	LWA	dB(A)
Klasa dokładności	Inżynieria (klasa 2)		
(*) Komentarz do skróconego oznaczenia: np. A7/W55			

A (powietrze), 7 (powietrze wejściowe - temperatura termometru suchego w °C) / W (woda), 55 (wyjściowa temperatura wody grzewczej (chłodzącej) w °C).

Zakres temperatur pracy:



→ Zakres temperatur roboczych - tryb grzania

Natężenie przepływu cieczy w:

Tryb grzania		
Minimum	0.6684	m3/h
Maksymalnie	2.9020	m3/h
Tryb chłodzenia		
Minimum	0.6684	m3/h
Maksimum	2.9020	m3/h

Zgodność z ČSN EN 14511-4:2023,  
artykuły: 4.2.1.2, 4.5, 4.6

Specyfikacja warunków:

Kontrola prędkości sprężarki	Zmienna	Objęściowe natężenie przepływu wody grzewczej (wewnętrzny wymiennik ciepła)	Zmienne
Temperatura wody na wylocie (wewnętrzny wymiennik ciepła)	Zmienna	Objęściowe natężenie przepływu cieczy źródłowej (zewnętrzny wymiennik ciepła)	-
Funkcja	Odwracalna		

Engineering Test Institute, Public Enterprise, potwierdza niniejszym certyfikatem, że badania przedmiotowego produktu zostały przeprowadzone i uzyskały wyniki podane powyżej. Engineering Test Institute, Public Enterprise jest akredytowanym Laboratorium Badawczym 1045.1.  
Brno, 2024-01-30

Inż. Mario Jankola, Kierownik ds. urządzeń grzewczych i produktów budowlanych /podpis odręczny/  
/Pieczęć okrągła/  
- KONIEC CERTYFIKATU -  
O-B-00133-24,, strona 2 (2)

Niniejszym poświadczam zgodność powyższego tłumaczenia z oryginałem dokumentu w języku angielskim. Rafał Wisiński, tłumacz przysięgły języka angielskiego wpisany na listę tłumaczy przysięgłych prowadzoną przez Ministra Sprawiedliwości pod numerem TP/329/05.  
Rep. Nr 857/2024



*Rafał Wisiński*

2024-03-25, 14:30

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# CERTYFIKAT BADAŃ

Nr O-B-00134-24

Klient

SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz POLSKA

Produkt

Zewnętrzna pompa ciepła powietrze/woda - monoblok

Oznaczenie typu / znak towarowy

NEXUS M17 PRO

Metody testowania

ČSN EN 14511-2:2023, ČSN EN 14511-3:2023,  
ČSN EN 14825:2023, ČSN EN 12102: 2023, Przepisy dotyczące badań EHPA -  
Badanie pomp ciepła powietrze/woda, wersja 2.4a

Podstawa certyfikatu

Raporty z badań:  
39-17312/T z dnia 2024-01-30 r.  
39-17312/H z dnia 2023-10-25 r.  
Dokumentacja techniczna SUNEX S.A.

Referencyjny sezon grzewczy

"A" = średnia  
(Referencyjna temperatura projektowa  $T_{design} = -10\text{ }^{\circ}\text{C}$ )

## Wyniki:

### NISKA TEMPERATURA (Referencyjna temperatura wody 35 °C)

### ŚREDNIA TEMPERATURA (Referencyjna temperatura wody 55 °C)

13.20	$P_{design}$ [kW] ... Ogrzewanie przy pełnym obciążeniu				12.85
4.81	SCOP [-] ... Sezonowy współczynnik wydajności				3.83
Temperatura zewnętrzna $T_j$ [°C]	Deklarowana wydajność grzewcza $P_{dH}$ [kW]	Współczynnik wydajności przy deklarowanej wydajności $COP_d$ [-]	Temperatura zewnętrzna $T_j$ [°C]	Deklarowana wydajność grzewcza $P_{dH}$ [kW]	Współczynnik wydajności przy deklarowanej wydajności $COP_d$ [-]
$T_j = -7$	11.679	3.059	$T_j = -7$	11.365	2.278
$T_j = +2$	7.092	4.709	$T_j = +2$	6.885	3.898
$T_j = +7$	6.430	6.519	$T_j = +7$	6.112	4.975
$T_j = +12$	6.519	6.985	$T_j = +12$	6.270	5.505
$T_j = TOL = -10$	10.817	2.821	$T_j = TOL = -10$	10.534	2.024
$T_j = T_{limnizacja} = -7$	11.679	3.059	$T_j = T_{limnizacja} = -7$	11.365	2.278

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/Pieczęć okrągła i stopka z danymi adresowymi/



2024-03-25 14:30



NISKA TEMPERATURA

(Referencyjna temperatura wody 35 °C)

ŚREDNIA TEMPERATURA

(Referencyjna temperatura wody 55 °C)

Zużycie energii w trybach innych niż "tryb aktywny":

15.7
15.7
15.7
0

Tryb wyłączenia	$P_{out}$	[W]
Tryb wyłączenia termostatu	$P_{to}$	[W]
Tryb gotowości	$P_{st}$	[W]
Tryb grzałki skrzyni korbowej	$P_{ck}$	[W]

15.7
15.7
15.7
0

5665	Roczne zużycie energii elektrycznej na ogrzewanie wg:	
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	ČSN EN 14825:2023 $Q_{HE}$ [kWh]	6931
189.6	ČSN EN 14825: 2023 $\eta_s$ [%]	150.2

Natężenie przepływu cieczy w zewnętrznym wymienniku ciepła:

Płyn źródłowy                      Min/Max                      [m³/h]

Natężenie przepływu cieczy w wewnętrznym wymienniku ciepła:  
Woda grzewcza                      Min/Max                      [m³/h]

Poziom mocy akustycznej w warunkach A7W55\* (przy 24%):

1.1165 / 2.0137

0.6684 / 1.2406

NEXUS M17 PRO

$L_{WA}$                       52.2 ± 1.5                      dB(A)

Klasa dokładności 2 (inżynierska)

(\*) Komentarz do skróconego oznaczenia:  
"A" powietrze, "T" temperatura na wlocie (temperatura suchego termometru) w °C, "W" woda, "35" wyjściowa temperatura wody w °C.

Specyfikacja warunków:

Kontrola prędkości sprężarki	Zmienna	Objęściowe natężenie przepływu wody grzewczej (wewnętrzny wymiennik ciepła)	Zmienne
Temperatura wody na wylocie (wewnętrzny wymiennik ciepła)	Zmienna	Objęściowe natężenie przepływu cieczy źródłowej (zewnętrzny wymiennik ciepła)	-
Funkcja	Odwracalna		

Engineering Test Institute, Public Enterprise, potwierdza niniejszym certyfikatem, że badania przedmiotowego produktu zostały przeprowadzone i uzyskały wyniki podane powyżej. Engineering Test Institute, Public Enterprise jest akredytowanym Laboratorium Badawczym 1045.1.  
Bmo, 2024-01-30  
Inż. Mario Jankola, Kierownik ds. urządzeń grzewczych i produktów budowlanych (podpis odręczny)  
/Pieczęć okrągła/

- KONIEC CERTYFIKATU -

O-B-00134-24, strona 2 (2)

Niniejszym poświadczam zgodność powyższego tłumaczenia z oryginałem dokumentu w języku angielskim. Rafał Wiśniński, tłumacz przysięgły języka angielskiego wpisany na listę tłumaczy przysięgłych prowadzoną przez Ministra Sprawiedliwości pod numerem TP/329/05.  
Rep. Nr 858/2024



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CERTYFIKAT BADAŃ

Nr O-B-00135-24

Klient

SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz POLSKA

Produkt

Zewnętrzna pompa ciepła powietrze/woda - monoblok

Oznaczenie typu / znak towarowy

NEXUS M17 PRO

Metody testowania

ČSN EN 14511-2:2023, ČSN EN 14511-3:2023,  
ČSN EN 14825:2023, ČSN EN 12102: 2023, Przepisy dotyczące badań EHPA -  
Badanie pomp ciepła powietrze/woda, wersja 2.4a

Podstawa certyfikatu

Raporty z badań:  
39-17312/T z dnia 2024-01-30 r.  
39-17312/H z dnia 2023-10-25 r.  
Dokumentacja techniczna SUNEX S.A.

Referencyjny sezon grzewczy

"W" = cieplejsza  
(Referencyjna temperatura projektowa T<sub>design</sub> = +2 °C)

Wyniki:

NISKA TEMPERATURA (Referencyjna temperatura wody 35 °C)			ŚREDNIA TEMPERATURA (Referencyjna temperatura wody 55 °C)		
8.13 P <sub>designh</sub> [kW] ... Ogrzewanie przy pełnym obciążeniu			8.29		
5.37 SCOP [-] ... Sezonowy współczynnik wydajności			3.84		
Temperatura zewnętrzna T <sub>j</sub> [°C]	Deklarowana wydajność grzewcza P <sub>dh</sub> [kW]	Współczynnik wydajności przy deklarowanej wydajności COP <sub>d</sub> [-]	Temperatura zewnętrzna T <sub>j</sub> [°C]	Deklarowana wydajność grzewcza P <sub>dh</sub> [kW]	Współczynnik wydajności przy deklarowanej wydajności COP <sub>d</sub> [-]
T <sub>j</sub> = +2	11.868	3.307	T <sub>j</sub> = +2	12.463	2.459
T <sub>j</sub> = +7 <sup>90</sup>	7.600	5.973	T <sub>j</sub> = +7 <sup>90</sup>	8.000	4.367
T <sub>j</sub> = +12 <sup>90</sup>	6.425	6.693	T <sub>j</sub> = +12 <sup>90</sup>	6.101	5.158
T <sub>j</sub> = TOL = +2	11.868	3.307	T <sub>j</sub> = TOL = +2	12.463	2.459
T <sub>j</sub> = T <sub>zwierzenia</sub> = +2	11.868	3.307	T <sub>j</sub> = T <sub>zwierzenia</sub> = +2	12.463	2.459

O-B-00135-24, strona 1(2)

/Pieczęć okrągła i stopka z danymi adresowymi/

2024-03-25, 14:30



NISKA TEMPERATURA

(Referencyjna temperatura wody 35 °C)

15.7
15.7
15.7
0

ŚREDNIA TEMPERATURA

(Referencyjna temperatura wody 55 °C)

Zużycie energii w trybach innych niż "tryb aktywny"

Tryb wyłączenia	$P_{out}$	[W]
Tryb wyłączenia termostatu	$P_{to}$	[W]
Tryb gotowości	$P_{stb}$	[W]
Tryb grzałki skrzyni korbowej	$P_{ck}$	[W]

15.7
15.7
15.7
0

2645	Roczne zużycie energii elektrycznej na ogrzewanie wg:	
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	ČSN EN 14825:2023 $Q_{wE}$ [kWh]	3685
236.7	ČSN EN 14825: 2023 $\eta_s$ [%]	177.7

Natężenie przepływu cieczy w zewnętrznym wymienniku ciepła:

Przyn źródłowy Min/Max [m³/h]

Natężenie przepływu cieczy w wewnętrznym wymienniku ciepła:

Woda grzewcza Min/Max [m³/h]

Poziom mocy akustycznej w warunkach A7W55\* (przy 24%):

1.1165 / 2.0137

0.6684 / 1.2406

NEXUS M17 PRO

$L_{WA}$  52.2 ± 1.5 dB(A)

Klasa dokładności 2 (inżynierska)

(\*) Komentarz do skróconego oznaczenia:  
"A" powietrze, "T" temperatura na wlocie (temperatura suchego termometru) w °C, "W" woda, "35" wyjściowa temperatura wody w °C.

Specyfikacja warunków:

Kontrola prędkości sprężarki	Zmienna	Objęściowe natężenie przepływu wody grzewczej (wewnętrzny wymiennik ciepła)	Zmienne
Temperatura wody na wylocie (wewnętrzny wymiennik ciepła)	Zmienna	Objęściowe natężenie przepływu cieczy źródłowej (zewnętrzny wymiennik ciepła)	-
Funkcja	Odwracalna		

Engineering Test Institute, Public Enterprise, potwierdza niniejszym certyfikatem, że badania przedmiotowego produktu zostały przeprowadzone i uzyskały wyniki podane powyżej. Engineering Test Institute, Public Enterprise jest akredytowanym Laboratorium Badawczym 1045.1.  
Bmo, 2024-01-30  
Inż. Mario Jankola, Kierownik ds. urządzeń grzewczych i produktów budowlanych /podpis odręczny/  
/Pieczęć okrągła/

- KONIEC CERTYFIKATU -

O-B-00135-24, strona 2 (2)

Niniejszym poświadczam zgodność powyższego tłumaczenia z oryginałem dokumentu w języku angielskim. Rafał Wiśniński, tłumacz przysięgły języka angielskiego wpisany na listę tłumaczy przysięgłych prowadzoną przez Ministra Sprawiedliwości pod numerem TP/329/05.

Rep. Nr 859/2024



2024-03-25 14:30

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# CERTYFIKAT BADAŃ

Nr: O-B-00136-24

Klient

SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz POLSKA

Produkt

Zewnętrzna pompa ciepła powietrze/woda - monoblok

Oznaczenie typu / znak towarowy

NEXUS M17 PRO

Metody testowania

ČSN EN 14511-2:2023, ČSN EN 14511-3:2023,  
ČSN EN 14825:2023, ČSN EN 12102: 2023, Przepisy dotyczące badań EHPA -  
Badanie pomp ciepła powietrze/woda, wersja 2.4a

Podstawa certyfikatu

Raporty z badań:  
39-17312/T z dnia 2024-01-30 r.  
39-17312/H z dnia 2023-10-25 r.  
Dokumentacja techniczna SUNEX S.A.

Referencyjny sezon grzewczy

"C" = zimniejsza  
(Referencyjna temperatura projektowa  $T_{design} = -22\text{ }^{\circ}\text{C}$ )

## Wyniki:

**NISKA TEMPERATURA**  
(Referencyjna temperatura wody 35 °C)

**ŚREDNIA TEMPERATURA**  
(Referencyjna temperatura wody 55 °C)

19.33	$P_{design}$ [kW] ... Ogrzewanie przy pełnym obciążeniu				19.10
3.86	SCOP [-] ... Sezonowy współczynnik wydajności				3.21
Temperatura zewnętrzna $T_j$ [°C]	Deklarowana wydajność grzewcza $P_{dH}$ [kW]	Współczynnik wydajności przy deklarowanej wydajności COPd [-]	Temperatura zewnętrzna $T_j$ [°C]	Deklarowana wydajność grzewcza $P_{dH}$ [kW]	Współczynnik wydajności przy deklarowanej wydajności COPd [-]
$T_j = -7$	11.700	3.299	$T_j = -7$	11.560	2.624
$T_j = +2$	7.100	5.235	$T_j = +2$	7.000	4.321
$T_j = +7^{(H)}$	6.344	6.547	$T_j = +7^{(H)}$	6.296	5.480
$T_j = +12$	6.579	7.031	$T_j = +12$	6.324	5.701
$T_j = TOL = -22$	8.884	2.350	$T_j = TOL = -22$	8.865	1.723
$T_c = T_{wydajność} = -7$	11.700	3.299	$T_c = T_{wydajność} = -7$	11.560	2.624
$T_j = -15$	10.359	2.861	$T_j = -15$	9.983	2.129

O-B-00136-24, strona 1(2)

/Pieczęć okrągła i stopka z danymi adresowymi/



2024-03-25, 14:30



## NISKA TEMPERATURA

(Referencyjna temperatura wody 35 °C)

## ŚREDNIA TEMPERATURA

(Referencja temperatura wody 55 °C)

Zużycie energii w trybach innych niż "tryb aktywny"

15.7
15.7
15.7
0

Tryb wyłączenia	$P_{off}$	[W]
Tryb wyłączenia termostatu	$P_{TD}$	[W]
Tryb gotowości	$P_{on}$	[W]
Tryb czułości skrzyni korbowej	$P_{CK}$	[W]

15.7
15.7
15.7
0

Roczne zużycie energii elektrycznej na ogrzewanie wg:

12336

CSN EN 14825:2023

 $Q_{\text{out}} \quad [\text{kW/h}]$ 

14692

Sezonowa efektywność energetyczna ogrzewania pomieszczeń

151.5

ČSN EN 14825: 2023

1963

125.3

Nateżenie przepływu cieczy w zewnętrznym wymienniku ciepła:

Plyn źródłowy	Min/Max	[m <sup>3</sup> /h]
---------------	---------	---------------------

1 1465 / 2 0137

Natężenie przepływu cieczy w wewnętrznym wymienniku ciepła:

Woda opływowa	Min/Max	[m <sup>3</sup> /h]
Woda opływowa	Min/Max	[m <sup>3</sup> /h]

0.6584 / 1.2406

Poziom mocy akustycznej w warunkach A7W55\* (przy 24%):

NEXUS M17 PRO

$L_{\text{Aeq}}$	$52.2 \pm 1.5$	dB(A)
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Klasa dokładności 2 (inżynierska)

[?] Komentarz do skróconego oznaczenia

\*A\* - powietrze, \*T\* - temperatura na włocie (temperatura termometru) w °C, \*W\* - woda, \*35\* - wyjściowa temperatura wody w °C.

Specyfikacja warunków:

Kontrola prędkości sprężarki	Zmienna	Objęściowe natężenie przepływu wody grzewczej (wewnętrzny wymiennik ciepła)	Zmienne
Temperatura wody na wylocie (wewnętrzny wymiennik ciepła)	Zmienna	Objęściowe natężenie przepływu cieczy źródłowej (zewewnętrzny wymiennik ciepła)	-
Funkcja	Odwracalna		

Engineering Test Institute, Public Enterprise, potwierdza niniejszym certyfikatem, że badania przedmiotowego produktu zostały przeprowadzone i uzyskały wyniki podane powyżej. Engineering Test Institute, Public Enterprise jest akredytowanym Laboratorium Badawczym 1045.1.

Brno, 2024-01-30

Inż. Marjo Jankola, Kierownik ds. urządzeń przewoznych i produktów budowlanych /podpis odrecznik/

/Pieczęć okrągłą/

- KONIEC CERTYFIKATU -

O-B-00136-24, strona 2 (2)

Niniejszym poświadczam zgodność powyższego tłumaczenia z oryginałem dokumentu w języku angielskim. Rafał Wiśniński, tłumacz przysięgły języka angielskiego wpisany na listę tłumaczy przysięgłych prowadzoną przez Ministra Sprawiedliwości pod numerem TP/329/05.

Rep. Nr 860/2024

Alindale







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

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## TEST REPORT 39-17312/T

**Product:** Outdoor Air/Water Heat Pump – monobloc

**Type designation:** NEXUS M17 PRO

**Customer:** SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz  
POLAND

**Manufacturer:** SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz  
POLAND

**Employee responsible:** Ing. Mario Jankola

**Report issue date:** 2024-01-30

**Distribution list:** 1 copy to the Customer  
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SP-2021-000012\_1\_10

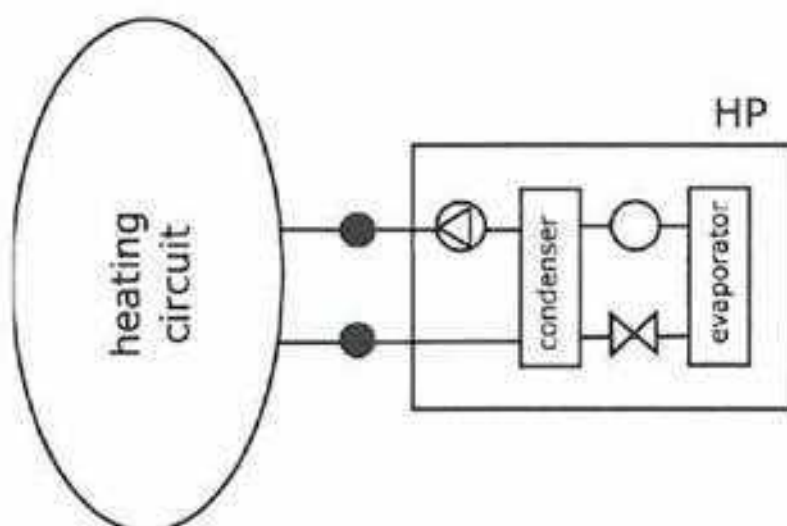
## I. Description of product tested

The Heat pump **NEXUS M17 PRO** supplied by the company **SUNEX S.A.** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor. Refrigerant R290 is used with charge 2.8 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 **NEXUS M17 PRO**:

- Serial number 235078404
- Cubic shape with dimensions 1255 × 670 × 1050 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- Cubic-shaped evaporator, 3 rows, dimensions 825 × 90 × 1005 mm (W × D × H), spacing 3 mm
- Plate condenser, dimensions 160 × 140 × 545 mm (W × D × H) including insulation
- Compressor Siam Compressor Industry APB52FFAMT
- Refrigerant R290 (2.8 kg)
- Electric expansion valve Carel E<sup>2</sup>V
- 4-way reversing valve Sanhua SHF-20D-46-02
- Refrigerant accumulator
- Liquid refrigerant separator
- Axial fan Ø48 cm with motor Ziehl-Abegg FN050-6IQ.BD.V5P4
- Pressure control Alco Controls
- Pressure sensors
- Temperature sensors
- Refrigerant pipes
- Relief valve
- Filter drier Sanhua DTGB 083s
- Check valves Sanhua YCVS10-44GSHC-1
- Circulation pump Grundfos UPM4 K
- Sight glass
- Coil Emerson ESC-EX230VAC

Scheme:





**Photodocumentation:**



Heat pump NEXUS M17 PRO - outdoor unit  
- Front view -



Heat pump **NEXUS M17 PRO** - outdoor unit  
- Back view -



Heat pump **NEXUS M17 PRO** - outdoor unit  
- Without cover -

[illegible]

Heat pump NEXUS M17 PRO - outdoor unit  
- Label -



Heat pump NEXUS M17 PRO - outdoor unit  
– Compressor label –

## II. Sample tested

SZU reg. no.	Product name	Date of submission
0213.23.39007.001	Outdoor Air/Water heat pump – monobloc	2023-10-16

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

## III. Measuring and test equipment:

No.	Description:	Inventory number:
1.	Electrical energy meter	E2.1
2.	Digital watt meter	1.2.2 ENERGIE ANALYZATOR_2
3.	Flow meter Krohné Optiflux	8.1.1 TECH_K1_V_DN15
4.	Barometer	2.4 MAR18_1_PB
5.	Differential pressure gauge	3.2 MAR18_2_dP
6.	Temperature-humidity meter HF532	3.1.1 K2_VLHKOST_1
7.	Temperature-humidity meter HF532	3.1.3 K2_VLHKOST_2
8.	Thermometers	3.4 MAR18_T



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 – 15	x
3.	Seasonal performance tests and SCOP calculation – Medium temperature application	–	ČSN EN 14511-3:2023 ČSN EN 14825:2023	Page No. 16 – 23	x
4.	Safety tests	Art. 4.2.1.2 Art. 4.2.1.3 Art. 4.5 sect. a) Art. 4.5 sect. b) Art. 4.6	ČSN EN 14511-4:2023	Page No. 24 – 26	+
5.	Out of accredited tests – SCOP calculations	–	ČSN EN 14511-3:2023 ČSN EN 14825:2023	Page No. 27 – 38	x

\* Evaluation / statement of conformity:

+ ..... Requirement fulfilled  
 - ..... Requirement not fulfilled

0 ..... Not applicable  
 x ..... Not evaluated

Measured quantity	Unit	Uncertainty measurement	of	Evaluation
<b>Liquid</b>				
- temperature difference (dT)	[K]	$\pm 0.15 \text{ K}$		fulfilled
- temperature inlet/outlet	[°C]	$\pm 0.15 \text{ K}$		fulfilled
- volume flow	[m <sup>3</sup> /s]	$\pm 1 \%$		fulfilled
- static pressure difference	[kPa]	$\pm 1 \text{ kPa}$ ( $\Delta p \leq 20 \text{ kPa}$ ) or $\pm 5 \%$ ( $\Delta p > 20 \text{ kPa}$ )		fulfilled
<b>Air</b>				
- dry bulb temperature	[°C]	$\pm 0.2 \text{ K}$		fulfilled
- wet bulb temperature	[°C]	$\pm 0.4 \text{ K}$		fulfilled
- volume flow	[m <sup>3</sup> /s]	$\pm 5 \%$		not applied
- static pressure difference	[Pa]	$\pm 5 \text{ Pa}$ ( $\Delta p \leq 100 \text{ Pa}$ ) or $\pm 5 \%$ ( $\Delta p > 100 \text{ Pa}$ )		not applied
<b>Refrigerant</b>				
- pressure at compressor outlet	[kPa]	$\pm 1 \%$		not applied
- temperature	[°C]	$\pm 0.5 \text{ K}$		not applied
<b>Concentration (in volume)</b>				
- heat transfer medium	[%]	$\pm 2$		not related
<b>Electrical quantities</b>				
- electric power	[W]	$\pm 1 \%$		fulfilled
- voltage	[V]	$\pm 0.5 \%$		fulfilled
- current	[A]	$\pm 0.5 \%$		fulfilled
- electric energy	[kWh]	$\pm 1 \%$		not applied
<b>Compressor rotational speed</b>	[min <sup>-1</sup> ]	$\pm 0.5 \%$		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)



<b>Test objective:</b>	Rating conditions
<b>Exact name of the test procedure:</b>	1.37* - Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions
<b>Test method:</b>	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
<b>Sample tested:</b>	Heat pump NEXUS M17 PRO
<b>Measuring equipment used:</b>	see Chapter III

Specification of the assessment condition*		A7/W35	A7/W55
Date of testing		2023-10-16	2023-10-16
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	55.07
Input heating water – temperature calculation	[°C]	29.99	47.00
Output heating water temperature	[°C]	34.97	55.07
Input heating water temperature	[°C]	29.99	47.00
Air temperature – dry bulb temperature	[°C]	7.00	7.00
Air temperature – wet bulb temperature	[°C]	6.02	6.01
Relative humidity	[%]	87.03	87.02
Barometric pressure	[kPa]	98.954	98.949
Ambient temperature	[°C]	7.53	7.41
Secondary circuit pressure difference	[kPa]	-17.687	10.194
Efficiency of the secondary liquid pump	[–]	0.266	0.174
Volume flow rate of heating water	[m <sup>3</sup> ·h <sup>-1</sup> ]	2.9020	1.7128
Density of heating water	[kg·m <sup>-3</sup> ]	994.0	985.9
Specific heat capacity of heating water	[kJ·kg <sup>-1</sup> ·K <sup>-1</sup> ]	4.175	4.178
Voltage	[V]	402.07	403.65
Total current	[A]	25.74	35.12
Overall power input	[kW]	3.903	5.414
Capacity correction of sec. liquid pump	[W]	-39.436	23.014
Power input correction of sec. liquid pump	[W]	-53.69	27.86
Heating capacity – heating water	[kW]	16.669	15.821
<b>Corrected heating capacity – heating water</b>	<b>[kW]</b>	<b>16.708</b>	<b>15.798</b>
Uncertainty of corrected heating capacity	[kW]	± 0.289	± 0.174
<b>Effective electric power input</b>	<b>[kW]</b>	<b>3.956</b>	<b>5.386</b>
<b>COP</b>	<b>[–]</b>	<b>4.223</b>	<b>2.933</b>
Uncertainty of COP	[–]	± 0.074	± 0.032
<b>Control settings</b>	<b>[rps]</b>	<b>95</b>	<b>95</b>
Circulation pump settings – heating water	[%]	50	50

<b>Test objective:</b>	Seasonal performance tests and SCOP calculation – Low temperature application
<b>Exact name of the test procedure:</b>	1.37* - Tests of leakage, pressure resistance, thermal and technical parameters, combustion efficiency, safety functions
<b>Test method:</b>	ČSN EN 14511-2:2023, ČSN EN 14511-3:2023, EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
<b>Sample tested:</b>	Heat pump NEXUS M17 PRO
<b>Measuring equipment used:</b>	see Chapter III

Design			Air / water – monobloc			
Conditions specification according to ČSN 14825:2023	to EN	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 efficiency	Heating	Average	$\eta_s$		189.6	%
		Warmer	$\eta_s$		236.7 (Not tested)	%
		Colder	$\eta_s$		151.5 (Not tested)	%
Seasonal efficiency according to ČSN 14825:2023	Heating	Average	SCOP		4.81	–
		Warmer	SCOP		5.99 (Not tested)	–
		Colder	SCOP		3.86 (Not tested)	–
Function	Cooling			Yes		
	Heating	Yes	Reference heating season	Average	Yes	
				Warmer	Yes	
				Colder	Yes	
Full heating load	Cooling		$P_{design}$	– kW		
	Heating	Average	$P_{design}$	13.20 kW		
		Warmer	$P_{design}$	11.87 kW		
		Colder	$P_{design}$	19.33 kW		
Bivalent temperatures	Heating	Average	$T_{bivalent}$	-7 °C		
		Warmer	$T_{bivalent}$	2 °C		
		Colder	$T_{bivalent}$	-7 °C		
Operation temperatures limit	Heating	Average	TOL	-10 °C		
		Warmer	TOL	2 °C		
		Colder	TOL	-22 °C		
Seasonal power consumption according to ČSN EN 14825:2023	Cooling		$Q_{aE}$	– kWh		
	Heating	Average	$Q_{aE}$	5665 kWh		
		Warmer	$Q_{aE}$	2645 (Not tested) kWh		
		Colder	$Q_{aE}$	12336 (Not tested) kWh		
Modes other than „active mode“		Off mode		$P_{off}$	15.7	W
		Thermostat off mode		$P_{ro}$	15.7	W
		Standby mode		$P_{sb}$	15.7	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 heat pumps and reference heating season „A“ = average

H <sub>HE</sub>	2066	[h]
H <sub>TD</sub>	178	[h]
H <sub>SA</sub>	0	[h]
H <sub>CK</sub>	178	[h]
H <sub>OFF</sub>	0	[h]

Measured data:

P <sub>TD</sub>	0.0157	[kW]
P <sub>SA</sub>	0.0157	[kW]
P <sub>CK</sub>	0.0000	[kW]
P <sub>OFF</sub>	0.0157	[kW]
P <sub>design</sub>	13.20	[kW]
SCOP <sub>UN</sub>	4.82	[-]

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<sub>H</sub>)

$$Q_H = P_{\text{design}} \cdot H_{HE} \quad [\text{kWh}]$$

$$Q_H = 13.2 \cdot 2066 = 27276 \quad [\text{kWh}]$$

7.4 Calculation of the annual electricity consumption (Q<sub>HE</sub>)

$$Q_{HE} = Q_H / \text{SCOP}_{UN} + H_{TD} \cdot P_{TD} + H_{SA} \cdot P_{SA} + H_{CK} \cdot P_{CK} + H_{OFF} \cdot P_{OFF} \quad [\text{kWh}]$$

$$Q_{HE} = 27276 / 4.82 + 178 \cdot 0.0157 + 0 \cdot 0.0157 + 178 \cdot 0 + 0 \cdot 0.0157 = 5665 \quad [\text{kWh}]$$

7.2 General formula for calculation of reference SCOP

$$\text{SCOP} = Q_H / Q_{HE} \quad [-]$$

$$\text{SCOP} = 27276 / 5665 = 4.81 \quad [-]$$

7.1 Calculation of the seasonal space heating efficiency  $\eta_s$

$$\Sigma F(i) = F(1) + F(2) \quad [-]$$

$$\Sigma F = 0.03 + 0 = 0.03 \quad [-]$$

$$\eta_s = 1 / \text{CC} \cdot \text{SCOP} - \Sigma F(i) \quad [-]$$

$$\eta_s / A = (1 / 2.5) \cdot 4.81 - 0.03 = \underline{1.896} \quad [-]$$



Temperature level		Low (reference water temperature 35 °C)		
Reference heating season		A* = average ( $T_{design} = -10\text{ °C}$ )		
Assessment condition		A, T <sub>biv</sub> (F)	B	C
Specification of the assessment condition*		A-7/W34	A2/W30	A7/W28.44
Date of testing		2023-10-17	2023-10-19	2023-10-20
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	70.1	70.0
Output heating water – temperature calculation	[°C]	33.99	29.95	28.45
Input heating water – temperature calculation	[°C]	28.96	24.95	23.44
Output heating water temperature	[°C]	33.99	29.95	28.45
Input heating water temperature	[°C]	28.96	24.95	23.44
Air temperature – dry bulb temperature	[°C]	-6.99	2.00	7.00
Air temperature – wet bulb temperature	[°C]	-8.00	1.00	6.00
Relative humidity	[%]	74.83	83.99	87.03
Barometric pressure	[kPa]	98.975	97.135	95.682
Ambient temperature	[°C]	-7.13	1.89	6.75
Secondary circuit pressure difference	[kPa]	4.164	16.665	18.089
Efficiency of the secondary liquid pump	[-]	0.123	0.184	0.183
Volume flow rate of heating water	[m <sup>3</sup> ·h <sup>-1</sup> ]	2.0137	1.2325	1.1165
Density of heating water	[kg·m <sup>-3</sup> ]	994.4	995.6	996.0
Specific heat capacity of heating water	[kJ·kg <sup>-1</sup> ·K <sup>-1</sup> ]	4.175	4.177	4.178
Voltage	[V]	400.30	400.84	402.59
Total current	[A]	26.97	11.45	8.86
Overall power input	[kW]	3.834	1.537	1.017
Capacity correction of sec. liquid pump	[W]	14.049	25.238	25.004
Power input correction of sec. liquid pump	[W]	16.38	30.94	30.61
Heating capacity – heating water	[kW]	11.693	7.117	6.455
Corrected heating capacity – heating water	[kW]	11.679	7.092	6.430
Uncertainty of corrected heating capacity	[kW]	± 0.201	± 0.123	± 0.111
Effective electric power input	[kW]	3.818	1.506	0.986
COP	[-]	3.059	4.709	6.519
Uncertainty of COP	[-]	± 0.052	± 0.083	± 0.116
Control settings	[rps]	95	43	35
Circulation pump settings – heating water	[%]	50	50	50

Temperature level		Low (reference water temperature 35 °C)	
Reference heating season		J <sub>A</sub> * = average (T <sub>design</sub> = -10 °C)	
Assessment condition		D	TOL (E)
Specification of the assessment condition*		A12/W27.44	A-10/W35
Date of testing		2023-10-25	2023-10-18
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]	27.47	34.96
Input heating water – temperature calculation	[°C]	22.47	29.96
Output heating water temperature	[°C]	27.47	34.96
Input heating water temperature	[°C]	22.47	29.96
Air temperature – dry bulb temperature	[°C]	12.00	-10.00
Air temperature – wet bulb temperature	[°C]	10.99	-11.02
Relative humidity	[%]	88.95	69.17
Barometric pressure	[kPa]	97.284	98.647
Ambient temperature	[°C]	11.99	-10.06
Secondary circuit pressure difference	[kPa]	17.854	7.078
Efficiency of the secondary liquid pump	[-]	0.184	0.149
Volume flow rate of heating water	[m <sup>3</sup> ·h <sup>-1</sup> ]	1.1356	1.8765
Density of heating water	[kg·m <sup>-3</sup> ]	996.3	994.1
Specific heat capacity of heating water	[kJ·kg <sup>-1</sup> ·K <sup>-1</sup> ]	4.178	4.175
Voltage	[V]	400.67	401.43
Total current	[A]	8.75	26.10
Overall power input	[kW]	0.967	3.858
Capacity correction of sec. liquid pump	[W]	25.058	19.426
Power input correction of sec. liquid pump	[W]	30.69	23.12
Heating capacity – heating water	[kW]	6.567	10.836
<b>Corrected heating capacity – heating water</b>	<b>[kW]</b>	<b>6.542</b>	<b>10.817</b>
Uncertainty of corrected heating capacity	[kW]	± 0.113	± 0.187
<b>Effective electric power input</b>	<b>[kW]</b>	<b>0.937</b>	<b>3.835</b>
<b>COP</b>	<b>[-]</b>	<b>6.985</b>	<b>2.821</b>
Uncertainty of COP	[-]	± 0.124	± 0.049
<b>Control settings</b>	<b>[rps]</b>	<b>35</b>	<b>95</b>
Circulation pump settings – heating water	[%]	50	50



Temperature level		Low (reference water temperature 35 °C)		
Reference heating season		„W“ = warmer ( $T_{design} = 2$ °C)	„C“ = colder ( $T_{design} =$ -22 °C)	
Assessment condition		B, TOL (E), Tbiv (F)	D	Tbiv (F)
Specification of the assessment condition*		A2/W35	A12/W27.45	A-7/W30
Date of testing		2023-10-23	2023-10-30	2023-10-26
Transient test procedure	YES / NO	YES	NO	NO
Average defrost time of 1 cycle	[min]	4.8	–	–
Average time of 1 cycle	[min]	49.6	–	–
Calculation time	[min]	148.8	70.0	70.0
Output heating water – temperature calculation	[°C]	34.05	27.45	29.88
Input heating water – temperature calculation	[°C]	29.95	22.45	24.97
Output heating water temperature	[°C]	35.01	27.45	29.88
Input heating water temperature	[°C]	30.00	22.45	24.97
Air temperature – dry bulb temperature	[°C]	1.90	11.99	-7.02
Air temperature – wet bulb temperature	[°C]	0.81	11.00	-8.02
Relative humidity	[%]	82.31	89.09	75.06
Barometric pressure	[kPa]	98.631	97.918	96.736
Ambient temperature	[°C]	2.06	12.01	-6.92
Secondary circuit pressure difference	[kPa]	-7.528	17.898	2.811
Efficiency of the secondary liquid pump	[-]	0.179	0.184	0.133
Volume flow rate of heating water	[m³·h⁻¹]	2.5041	1.1427	2.0627
Density of heating water	[kg·m⁻³]	994.3	996.3	995.6
Specific heat capacity of heating water	[kJ·kg⁻¹·K⁻¹]	4.176	4.178	4.177
Voltage	[V]	402.08	402.05	401.07
Total current	[A]	24.14	8.62	22.68
Overall power input	[kW]	3.560	0.967	3.558
Capacity correction of sec. liquid pump	[W]	-24.055	25.179	10.507
Power input correction of sec. liquid pump	[W]	-29.29	30.86	12.12
Heating capacity – heating water	[kW]	11.844	6.605	11.711
Corrected heating capacity – heating water	[kW]	11.868	6.579	11.700
Uncertainty of corrected heating capacity	[kW]	± 0.248	± 0.114	± 0.206
Effective electric power input	[kW]	3.589	0.936	3.546
COP	[-]	3.307	7.031	3.299
Uncertainty of COP	[-]	± 0.069	± 0.125	± 0.058
Control settings	[rps]	95	35	95
Circulation pump settings – heating water	[-]	50	50	50



**Data for SCOP calculation**

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

	Outdoor heat exchanger	Indoor heat exchanger	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	Eft. power input of compressor off state
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]	[kW]
<b>A</b>	-7	34.00	88.46	11.68	11.679	3.059	0.900	1.00	3.059	–
<b>B</b>	2	30.00	53.85	7.11	7.092	4.709	0.900	1.00	4.709	–
<b>C</b>	7	28.45	34.62	4.57	6.430	6.519	0.984	0.71	6.477	0.0157
<b>D</b>	12	27.44	15.38	2.03	6.519	6.985	0.983	0.31	6.735	0.0157
<b>TOL (E)</b>	-10	35.00	100.00	13.20	10.817	2.821	0.900	1.00	2.821	–
<b>Tblv (F)</b>	-7	34.00	88.46	11.68	11.679	3.059	0.900	1.00	3.059	–

**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
- Variable water flow rate – secondary circuit

General formulas and derivation:

$$\begin{aligned}
 t_{\text{outlet, average}} &= t_{\text{inlet, capacity test}} + (t_{\text{outlet, capacity test}} - t_{\text{inlet, capacity test}}) \cdot CR & [^{\circ}\text{C}] \\
 t_{\text{outlet, average}} &= t_{\text{inlet, capacity test}} + (\Delta t) \cdot CR & [^{\circ}\text{C}] \\
 t_{\text{outlet, average}} &= t_{\text{outlet, capacity test}} - \Delta t + \Delta t \cdot CR & [^{\circ}\text{C}] \\
 t_{\text{outlet, capacity test}} &= t_{\text{outlet, average}} + \Delta t - \Delta t \cdot CR & [^{\circ}\text{C}]
 \end{aligned}$$

For variable flow:

$$\Delta t = 5$$

$$CR \cdot \Delta t = \text{Part load} / \text{Declared capacity} \cdot 5$$

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

Measured data:

$t_{\text{outlet, average}}$	24.00	[°C]
Declared capacity	6.519	[kW]
Declared capacity standard rating condition A7/W35	-	[kW]
Part load	2.03	[kW]

Calculation of water temperature

$$t_{\text{outlet, capacity test, variable flow}} = 24 + 5 - 2.03 / 6.519 \cdot 5 = \underline{\underline{27.44}} \quad [^{\circ}\text{C}]$$

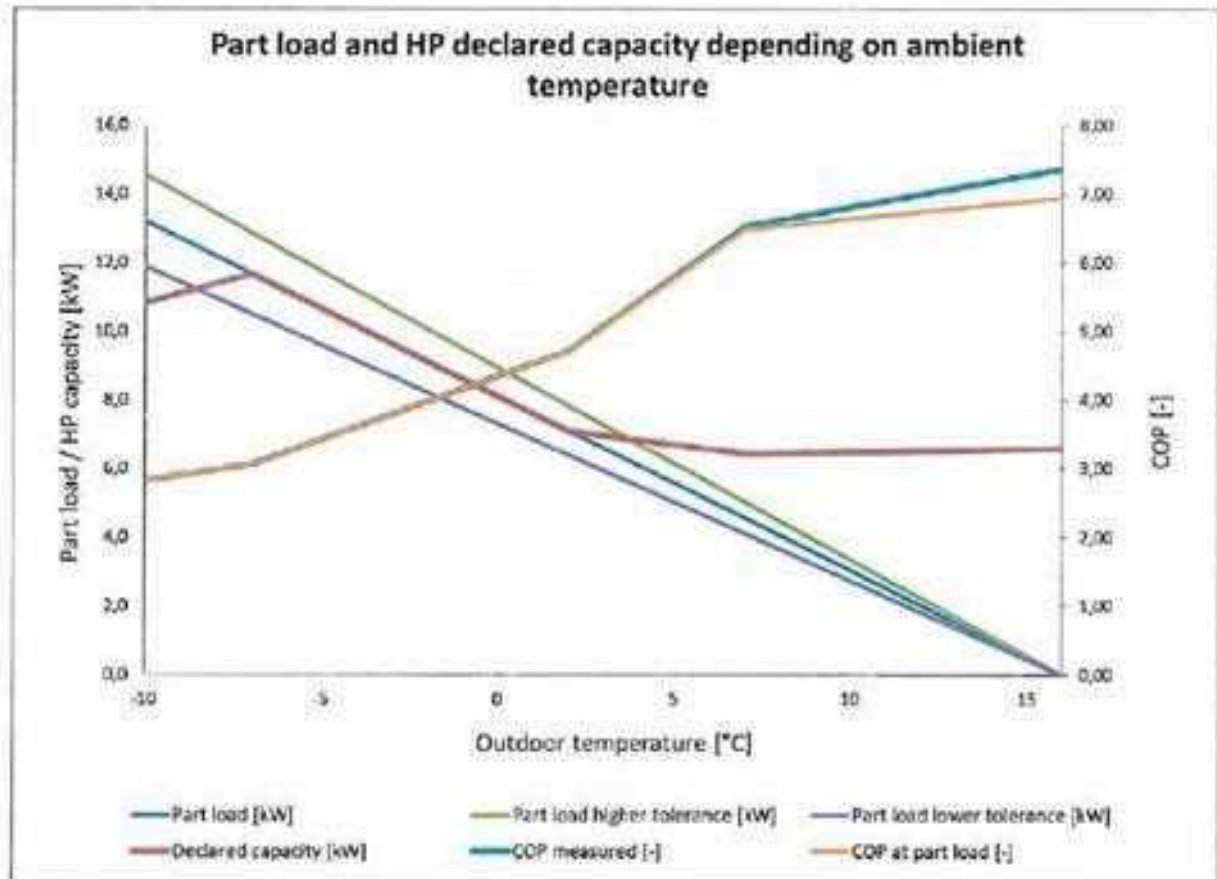
Calculation SCOP, SCOP<sub>on</sub>, SCOP<sub>net</sub>

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

	Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	J	Tj	h		Ph(Tj)			elbu(Tj)	h x elbu(Tj)	COPb in (Tj)	h x P h(Tj)		h x (P h(Tj) - elbu(Tj))	
	[-]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
TOL (E)	21	-10	1	100.90	13.20	10.82	10.82	2.39	2.39	2.82	13	6	11	4
	22	-9	25	96.15	12.69	11.10	11.10	1.59	39.75	2.90	317	135	278	96
	23	-8	23	92.31	12.19	11.38	11.38	0.90	18.29	2.90	280	100	262	86
A, Tbin (F)	24	-7	24	88.48	11.68	11.68	11.68	0.55	0.00	3.06	280	92	290	92
	25	-6	27	84.62	11.17	11.17	11.17	0.00	0.00	3.24	302	93	302	93
	26	-5	66	80.77	10.66	10.66	10.66	0.00	0.00	3.43	725	212	725	212
	27	-4	91	76.92	10.16	10.15	10.15	0.00	0.00	3.61	624	258	624	256
	28	-3	89	73.08	9.65	9.64	9.64	0.00	0.00	3.79	859	226	859	226
	29	-2	185	69.23	9.14	9.13	9.13	0.00	0.00	3.98	1508	379	1508	379
	30	-1	173	65.38	8.63	8.62	8.62	0.00	0.00	4.16	1493	359	1493	359
	31	0	240	61.54	8.12	8.11	8.11	0.00	0.00	4.34	1950	449	1950	449
	32	1	280	57.69	7.62	7.60	7.60	0.00	0.00	4.53	2133	471	2133	471
B	33	2	320	53.85	7.11	7.09	7.09	0.00	0.00	4.71	2275	483	2275	483
	34	3	357	50.00	6.60	6.56	6.60	0.00	0.00	5.06	2357	465	2357	465
	35	4	356	46.15	6.09	6.03	6.09	0.00	0.00	5.42	2169	401	2169	401
	36	5	303	42.31	5.59	5.59	5.59	0.00	0.00	5.77	1692	293	1692	293
	37	6	330	38.46	5.08	5.06	5.06	0.00	0.00	6.12	1676	274	1676	274
C	38	7	326	34.62	4.57	4.43	4.57	0.00	0.00	6.48	1499	230	1499	230
	39	8	348	30.77	4.06	4.06	4.06	0.00	0.00	6.83	1414	217	1414	217
	40	9	335	26.92	3.55	3.47	3.55	0.00	0.00	6.68	1191	181	1191	181
	41	10	315	23.08	3.05	3.05	3.05	0.00	0.00	6.93	960	145	960	145
	42	11	215	19.23	2.54	2.54	2.54	0.00	0.00	6.88	546	82	546	82
D	43	12	169	15.38	2.03	2.03	2.03	0.00	0.00	6.73	343	51	343	51
	44	13	151	11.54	1.52	1.52	1.52	0.00	0.00	6.79	230	34	230	34
	45	14	105	7.69	1.02	1.02	1.02	0.00	0.00	6.84	107	16	107	16
	46	15	74	3.85	0.51	0.51	0.51	0.00	0.00	6.89	38	6	38	6
	Σ		4910							Σ	27271	5661	27211	5601
											SCOPon	4.82	SCOPnet	4.86
													SCOP	4.81

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 14511-2:2023, ČSN EN 14511-3:2023, EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
Sample tested:	Heat pump NEXUS M17 PRO
Measuring equipment used:	see Chapter III

Design		Air / water – monobloc					
Conditions specification according to ČSN 14825:2023	to EN	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 efficiency	Heating	Average	$\eta_s$		150.2	%	
		Warmer	$\eta_w$		177.7 (Not tested)	%	
		Colder	$\eta_c$		125.3 (Not tested)	%	
Seasonal efficiency according to ČSN 14825:2023	Heating	Average	SCOP		3.83	–	
		Warmer	SCOP		4.52 (Not tested)	–	
		Colder	SCOP		3.21 (Not tested)	–	
Function	Cooling					Yes	
	Heating	Yes	Reference heating season	Average	Yes		
				Warmer	Yes		
				Colder	Yes		
Full heating load	Cooling		$P_{design}$		–	kW	
	Heating	Average	$P_{design}$		12.85	kW	
		Warmer	$P_{design}$		12.46	kW	
		Colder	$P_{design}$		19.10	kW	
Bivalent temperatures	Heating	Average	$T_{bivalent}$		-7	°C	
		Warmer	$T_{bivalent}$		2	°C	
		Colder	$T_{bivalent}$		-7	°C	
Operation temperatures limit	Heating	Average	TOL		-10	°C	
		Warmer	TOL		2	°C	
		Colder	TOL		-22	°C	
Seasonal consumption according to ČSN EN 14825:2023	power to	Cooling		$Q_{ce}$		–	kWh
		Heating	Average	$Q_{he}$		6931	kWh
			Warmer	$Q_{he}$		3685 (Not tested)	kWh
			Colder	$Q_{he}$		14682 (Not tested)	kWh
Modes other than „active mode“		Off mode			$P_{off}$	15.7	W
		Thermostat off mode			$P_{to}$	15.7	W
		Standby mode			$P_{sb}$	15.7	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 heat pumps and reference heating season „A“ = average

H <sub>HE</sub>	2066	[h]
H <sub>TO</sub>	178	[h]
H <sub>SA</sub>	0	[h]
H <sub>CK</sub>	178	[h]
H <sub>OFF</sub>	0	[h]

Measured data:

P <sub>TO</sub>	0.0157	[kW]
P <sub>SA</sub>	0.0157	[kW]
P <sub>CK</sub>	0.0000	[kW]
P <sub>OFF</sub>	0.0157	[kW]
P <sub>designh</sub>	12.85	[kW]
SCOP <sub>ON</sub>	3.83	[-]

Coefficient and correction:

F(1)	3	[%]
F(2)	0	[%]
CC	2.5	[-]

### Calculation of SCOP:

7.3 Calculation of the reference annual heating demand (Q<sub>H</sub>)

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

$$Q_H = 12.85 \cdot 2066 = 26543 \quad [kWh]$$

7.4 Calculation of the annual electricity consumption (Q<sub>HE</sub>)

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

$$Q_{HE} = 26543 / 3.83 + 178 \cdot 0.0157 + 0 \cdot 0.0157 + 178 \cdot 0 + 0 \cdot 0.0157 = 6931 \quad [kWh]$$

7.2 General formula for calculation of reference SCOP

$$SCOP = Q_H / Q_{HE} \quad [-]$$

$$SCOP = 26543 / 6931 = 3.83 \quad [-]$$

7.1 Calculation of the seasonal space heating efficiency  $\eta_s$

$$\Sigma F(i) = F(1) + F(2) \quad [-]$$

$$\Sigma F = 0.03 + 0 = 0.03 \quad [-]$$

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

$$\eta_s / A = (1 / 2.5) \cdot 3.83 - 0.03 = \underline{1.502} \quad [-]$$

Temperature level		Medium (reference water temperature 55 °C)		
Reference heating season		„A“ = average ( $T_{design} = -10\text{ °C}$ )		
Assessment condition		A, T <sub>biv</sub> (F)	B	C
Specification of the assessment condition*		A-7/W52	A2/W42	A7/W38.16
Date of testing		2023-10-17	2023-10-19	2023-10-20
Transient test procedure	YES / NO	NO	NO	NO
Average defrost time of 1 cycle	[min]	–	–	–
Average time of 1 cycle	[min]	–	–	–
Calculation time	[min]	70.1	70.0	70.0
Output heating water – temperature calculation	[°C]	51.96	41.96	38.15
Input heating water – temperature calculation	[°C]	43.95	33.96	30.15
Output heating water temperature	[°C]	51.96	41.96	38.15
Input heating water temperature	[°C]	43.95	33.96	30.15
Air temperature – dry bulb temperature	[°C]	-6.99	2.00	7.00
Air temperature – wet bulb temperature	[°C]	-7.99	1.00	6.01
Relative humidity	[%]	75.03	84.06	87.07
Barometric pressure	[kPa]	98.836	96.821	95.798
Ambient temperature	[°C]	-7.05	1.85	6.55
Secondary circuit pressure difference	[kPa]	17.886	21.546	22.032
Efficiency of the secondary liquid pump	[-]	0.133	0.170	0.165
Volume flow rate of heating water	[m <sup>3</sup> ·h <sup>-1</sup> ]	1.2406	0.7507	0.6684
Density of heating water	[kg·m <sup>-3</sup> ]	987.4	991.6	993.0
Specific heat capacity of heating water	[kJ·kg <sup>-1</sup> ·K <sup>-1</sup> ]	4.177	4.175	4.175
Voltage	[V]	402.02	401.81	402.58
Total current	[A]	32.61	13.14	10.70
Overall power input	[kW]	5.022	1.793	1.259
Capacity correction of sec. liquid pump	[W]	26.159	21.987	20.748
Power input correction of sec. liquid pump	[W]	32.25	26.48	24.84
Heating capacity – heating water	[kW]	11.391	6.907	6.160
<b>Corrected heating capacity – heating water</b>	<b>[kW]</b>	<b>11.365</b>	<b>6.885</b>	<b>6.139</b>
Uncertainty of corrected heating capacity	[kW]	± 0.126	± 0.076	± 0.068
<b>Effective electric power input</b>	<b>[kW]</b>	<b>4.990</b>	<b>1.766</b>	<b>1.234</b>
<b>COP</b>	<b>[-]</b>	<b>2.278</b>	<b>3.898</b>	<b>4.975</b>
Uncertainty of COP	[-]	± 0.025	± 0.044	± 0.057
<b>Control settings</b>	<b>[rps]</b>	<b>95</b>	<b>43</b>	<b>35</b>
Circulation pump settings – heating water	[%]	50	50	50



Temperature level		Medium (reference water temperature 55 °C)	
Reference heating season		ΔT* = average (T <sub>design</sub> = -10 °C)	
Assessment condition		D	TOL (E)
Specification of the assessment condition*		A12/W35.47	A-10/W55
Date of testing		2023-10-24	2023-10-18
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]	35.45	55.01
Input heating water – temperature calculation	[°C]	27.46	46.94
Output heating water temperature	[°C]	35.45	55.01
Input heating water temperature	[°C]	27.46	46.94
Air temperature – dry bulb temperature	[°C]	12.00	-10.00
Air temperature – wet bulb temperature	[°C]	11.00	-10.98
Relative humidity	[%]	88.94	70.18
Barometric pressure	[kPa]	97.357	98.478
Ambient temperature	[°C]	11.83	-10.02
Secondary circuit pressure difference	[kPa]	21.966	16.509
Efficiency of the secondary liquid pump	[-]	0.166	0.120
Volume flow rate of heating water	[m <sup>3</sup> ·h <sup>-1</sup> ]	0.6821	1.1440
Density of heating water	[kg·m <sup>-3</sup> ]	993.9	986.0
Specific heat capacity of heating water	[kJ·kg <sup>-1</sup> ·K <sup>-1</sup> ]	4.175	4.178
Voltage	[V]	403.52	402.57
Total current	[A]	9.76	34.90
Overall power input	[kW]	1.164	5.234
Capacity correction of sec. liquid pump	[W]	20.977	24.081
Power input correction of sec. liquid pump	[W]	25.14	29.33
Heating capacity – heating water	[kW]	6.290	10.558
<b>Corrected heating capacity – heating water</b>	<b>[kW]</b>	<b>6.270</b>	<b>10.534</b>
Uncertainty of corrected heating capacity	[kW]	± 0.070	± 0.116
<b>Effective electric power input</b>	<b>[kW]</b>	<b>1.139</b>	<b>5.204</b>
<b>COP</b>	<b>[-]</b>	<b>5.505</b>	<b>2.024</b>
Uncertainty of COP	[-]	± 0.063	± 0.022
<b>Control settings</b>	<b>[rps]</b>	<b>35</b>	<b>95</b>
Circulation pump settings – heating water	[%]	50	50

Temperature level		Medium (reference water temperature 55 °C)		
Reference heating season		„W“ = warmer ( $T_{design} = 2$ °C)	„C“ = colder ( $T_{design} =$ -22 °C)	
Assessment condition		B, TOL (E), Tblv (F)	C	Tblv (F)
Specification of the assessment condition*		A2/W55	A7/W34.24	A-7/W44
Date of testing		2023-10-23	2023-10-20	2023-10-18
Transient test procedure	YES / NO	YES	NO	NO
Average defrost time of 1 cycle	[min]	5.5	–	–
Average time of 1 cycle	[min]	107.8	–	–
Calculation time	[min]	107.8	70.0	70.0
Output heating water – temperature calculation	[°C]	54.19	34.15	44.10
Input heating water – temperature calculation	[°C]	46.98	26.14	36.04
Output heating water temperature	[°C]	54.98	34.15	44.10
Input heating water temperature	[°C]	47.01	26.14	36.04
Air temperature – dry bulb temperature	[°C]	1.98	7.00	-6.99
Air temperature – wet bulb temperature	[°C]	0.95	6.00	-8.01
Relative humidity	[%]	83.38	87.00	74.65
Barometric pressure	[kPa]	98.365	95.725	98.231
Ambient temperature	[°C]	1.95	6.73	-7.07
Secondary circuit pressure difference	[kPa]	13.289	21.946	16.672
Efficiency of the secondary liquid pump	[-]	0.182	0.166	0.113
Volume flow rate of heating water	[m <sup>3</sup> ·h <sup>-1</sup> ]	1.4957	0.6841	1.2514
Density of heating water	[kg·m <sup>-3</sup> ]	986.3	994.3	990.7
Specific heat capacity of heating water	[kJ·kg <sup>-1</sup> ·K <sup>-1</sup> ]	4.178	4.176	4.175
Voltage	[V]	402.89	403.24	400.64
Total current	[A]	33.22	9.69	31.28
Overall power input	[kW]	5.099	1.174	4.436
Capacity correction of sec. liquid pump	[W]	24.722	21.002	25.455
Power input correction of sec. liquid pump	[W]	30.22	25.17	31.25
Heating capacity – heating water	[kW]	12.488	6.315	11.585
<b>Corrected heating capacity – heating water</b>	<b>[kW]</b>	<b>12.463</b>	<b>6.294</b>	<b>11.560</b>
Uncertainty of corrected heating capacity	[kW]	± 0.150	± 0.070	± 0.127
<b>Effective electric power input</b>	<b>[kW]</b>	<b>5.069</b>	<b>1.148</b>	<b>4.405</b>
<b>COP</b>	<b>[-]</b>	<b>2.459</b>	<b>5.480</b>	<b>2.624</b>
Uncertainty of COP	[-]	± 0.030	± 0.063	± 0.029
<b>Control settings</b>	<b>[rps]</b>	<b>95</b>	<b>35</b>	<b>95</b>
Circulation pump settings – heating water	[%]	50	50	50



#### Data for SCOP calculation

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

	Outdoor heat exchanger	Indoor heat exchanger	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
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]	[kW]
<b>A</b>	-7	52.00	88.46	11.37	11.365	2.278	0.900	1.00	2.278	–
<b>B</b>	2	42.00	53.85	6.92	6.885	3.898	0.900	1.00	3.898	–
<b>C</b>	7	38.18	34.62	4.45	6.112	4.975	0.987	0.73	4.951	0.0157
<b>D</b>	12	35.48	15.38	1.98	6.270	5.505	0.986	0.32	5.345	0.0157
<b>TOL (E)</b>	-10	55.00	100.00	12.85	10.534	2.024	0.900	1.00	2.024	–
<b>Tbiv (F)</b>	-7	52.00	88.46	11.37	11.365	2.278	0.900	1.00	2.278	–

#### 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
- Variable water flow rate – secondary circuit

#### General formulas and derivation:

$$\begin{aligned}
 t_{\text{outlet, average}} &= t_{\text{inlet, capacity test}} + (t_{\text{outlet, capacity test}} - t_{\text{inlet, capacity test}}) \cdot CR & [^{\circ}\text{C}] \\
 t_{\text{outlet, average}} &= t_{\text{inlet, capacity test}} + (\Delta t) \cdot CR & [^{\circ}\text{C}] \\
 t_{\text{outlet, average}} &= t_{\text{outlet, capacity test}} - \Delta t + \Delta t \cdot CR & [^{\circ}\text{C}] \\
 t_{\text{outlet, capacity test}} &= t_{\text{outlet, average}} + \Delta t - \Delta t \cdot CR & [^{\circ}\text{C}]
 \end{aligned}$$

#### For variable flow:

$$\Delta t = 8$$

$$CR \cdot \Delta t = \text{Part load} / \text{Declared capacity} \cdot 8$$

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

#### Measured data:

t <sub>outlet, average</sub>	30.00	[°C]
Declared capacity	6.270	[kW]
Declared capacity standard rating condition A7W55	-	[kW]
Part load	1.98	[kW]

#### Calculation of water temperature

$$t_{\text{outlet, capacity test, variable flow}} = 30 + 8 - 1.98 / 6.27 \cdot 8 = \underline{\underline{35.48}} \quad [^{\circ}\text{C}]$$



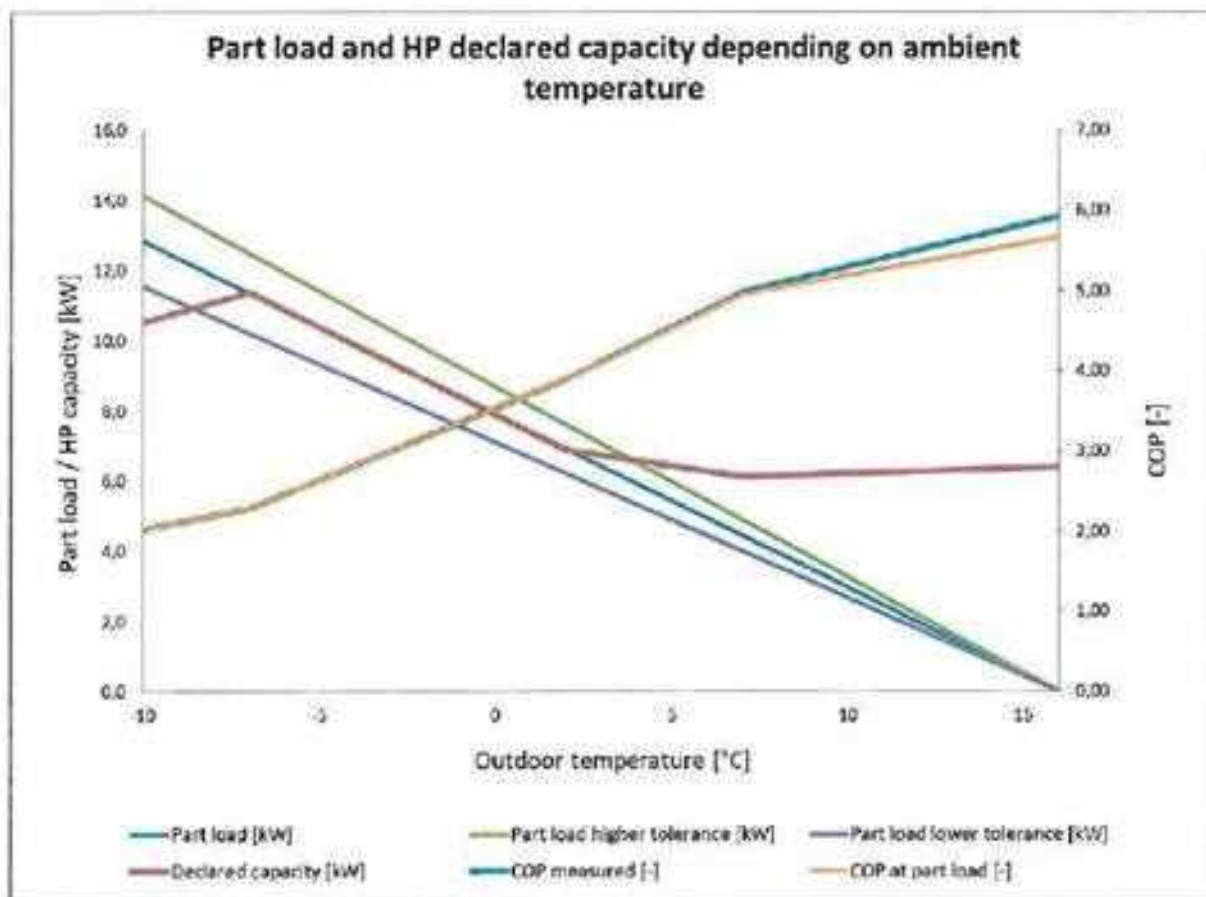
Calculation SCOP, SCOP<sub>ar</sub>, SCOP<sub>ref</sub>

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

	Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	j	Tj	h		Ph(Tj)			elbu(Tj)	h x elbu(Tj)	COPb in (Tj)	h x P h(Tj)		h x (P h(Tj) - elbu(Tj))	
	[-]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
TOL (E)	21	-10	1	100.00	12.85	10.53	10.53	2.31	2.31	2.92	13	8	11	5
	22	-5	25	98.15	12.35	10.81	10.81	1.54	38.66	2.11	308	167	270	128
	23	-5	23	92.31	11.86	11.09	11.09	0.77	17.74	2.19	273	134	255	116
A, Tdiv (F)	24	-7	24	88.46	11.37	11.37	11.37	0.00	0.00	2.28	273	120	273	120
	25	-6	27	84.62	10.87	10.87	10.87	0.00	0.00	2.46	294	119	294	119
	26	-5	68	80.77	10.38	10.37	10.37	0.00	0.00	2.64	706	287	706	287
	27	-4	91	76.92	9.88	9.87	9.87	0.00	0.00	2.82	899	319	899	319
	28	-3	89	73.08	9.38	9.37	9.37	0.00	0.00	3.00	836	279	836	279
	29	-2	165	69.23	8.88	8.88	8.88	0.00	0.00	3.18	1468	462	1468	462
	30	-1	173	65.38	8.40	8.38	8.38	0.00	0.00	3.36	1453	433	1453	433
	31	0	240	61.54	7.91	7.88	7.88	0.00	0.00	3.54	1887	536	1887	536
	32	1	280	57.69	7.41	7.38	7.38	0.00	0.00	3.72	2075	558	2075	558
B	33	2	320	53.85	6.92	6.89	6.89	0.00	0.00	3.90	2214	568	2214	568
	34	3	357	50.00	6.42	6.73	6.42	0.00	0.00	4.11	2293	558	2293	558
	35	4	356	46.15	5.93	6.58	5.93	0.00	0.00	4.32	2111	489	2111	489
	36	5	303	42.31	5.44	6.42	5.44	0.00	0.00	4.53	1847	384	1847	384
	37	6	330	38.46	4.94	6.27	4.94	0.00	0.00	4.74	1631	344	1631	344
C	38	7	326	34.62	4.45	6.11	4.45	0.00	0.00	4.95	1460	293	1460	293
	39	8	346	30.77	3.95	6.14	3.95	0.00	0.00	5.03	1376	273	1376	273
	40	9	336	26.92	3.46	6.18	3.46	0.00	0.00	5.11	1159	227	1159	227
	41	10	310	23.08	2.96	6.21	2.96	0.00	0.00	5.19	934	180	934	180
	42	11	215	19.23	2.47	6.24	2.47	0.00	0.00	5.27	531	101	531	101
D	43	12	160	15.38	1.98	6.27	1.98	0.00	0.00	5.34	334	62	334	62
	44	13	151	11.54	1.48	6.30	1.48	0.00	0.00	5.42	224	41	224	41
	45	14	105	7.69	0.99	6.33	0.99	0.00	0.00	5.50	104	19	104	19
	46	15	74	3.85	0.49	6.36	0.49	0.00	0.00	5.58	37	7	37	7
	Σ		4910							Σ	26538	6927	26478	6889
											SCOP <sub>bin</sub>	3.83	SCOP <sub>net</sub>	3.86
												SCOP		3.83

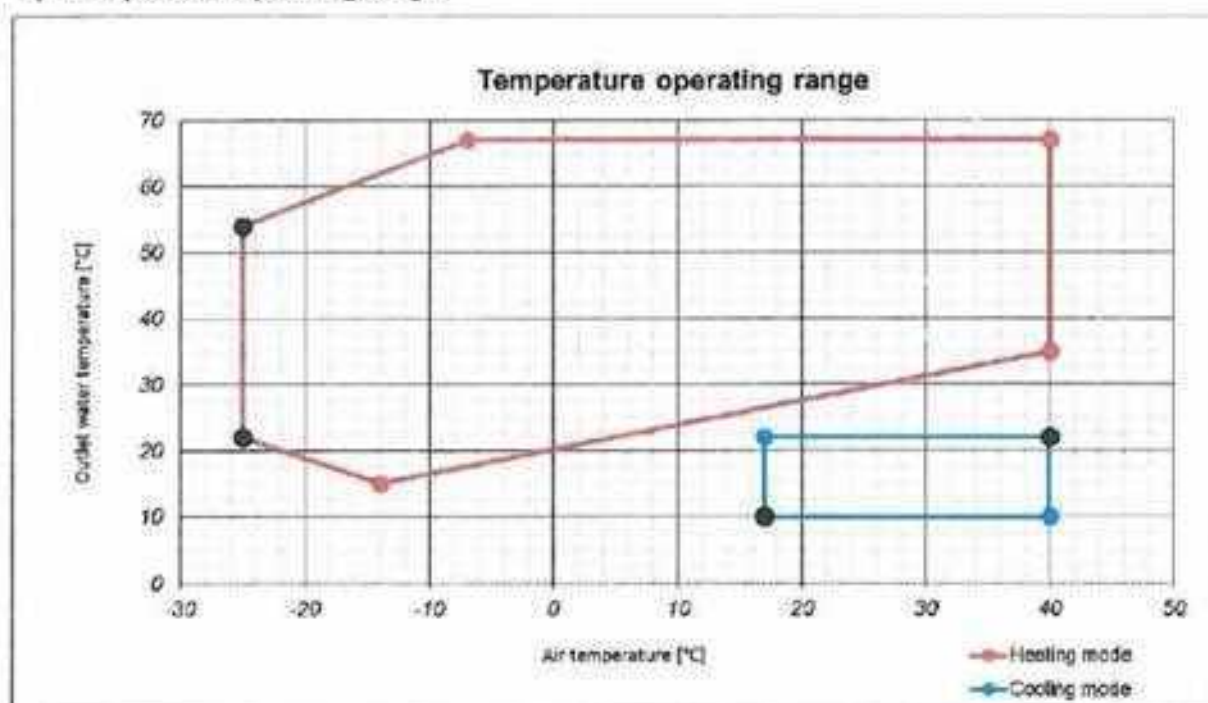
Part load performance diagram

- 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 NEXUS M17 PRO
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	22	Minimum	Minimum water flow rate: 0.6684 m³·h⁻¹ Maximum water flow rate: 2.9020 m³·h⁻¹
2.	A	-25	W	54	Minimum	
Cooling mode						
1.	A	17	W	10	Minimum	Minimum starting water flow rate: 0.6684 m³·h⁻¹ Maximum water flow rate: 2.9020 m³·h⁻¹
2.	A	40	W	22	Maximum	

Heat pump NEXUS M17 PRO 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	+
2 (starting)	Upper limit of use	Upper limit of use	maximum	Rated voltage	+

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 those 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	+	Operation with lower heating capacity with a defrost
Test for section a) Art. 4.5 ČSN EN 14511-4:2023 – cooling	+	Unit was turning off and on
Test for section b) Art. 4.5 ČSN EN 14511-4:2023 – heating	+	Unit turned off due to high pressure
Test for section b) Art. 4.5 ČSN EN 14511-4:2023 – cooling	+	Unit turned off due to high pressure
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.	

Test objective:	Out of accredited tests – SCOP calculations
Exact name of the test procedure:	<b>SCOP calculations – based on values provided by the customer</b>
Test method:	ČSN EN 14825:2023, EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
Sample tested:	Heat pump NEXUS M17 PRO

Data for SCOP calculation

- Low temperature application (reference water temperature 35 °C)
- Reference heating season „W” – warmer

	Outdoor heat exchanger	Indoor heat exchanger	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (Tj)	ER, power input of compressor off state
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]	[kW]
<b>A</b>	–	–	–	–	–	–	–	–	–	–
<b>B</b>	2	35.00	100.00	11.87	11.868	3.307	0.900	1.00	3.307	–
<b>C</b>	7	31.00	64.29	7.63	7.600	5.973	0.900	1.00	5.973	–
<b>D</b>	12	28.36	28.57	3.39	6.425	6.693	0.984	0.53	6.596	0.0157
<b>TOL (E)</b>	2	35.00	100.00	11.87	11.868	3.307	0.900	1.00	3.307	–
<b>Tbiv (F)</b>	2	35.00	100.00	11.87	11.868	3.307	0.900	1.00	3.307	–



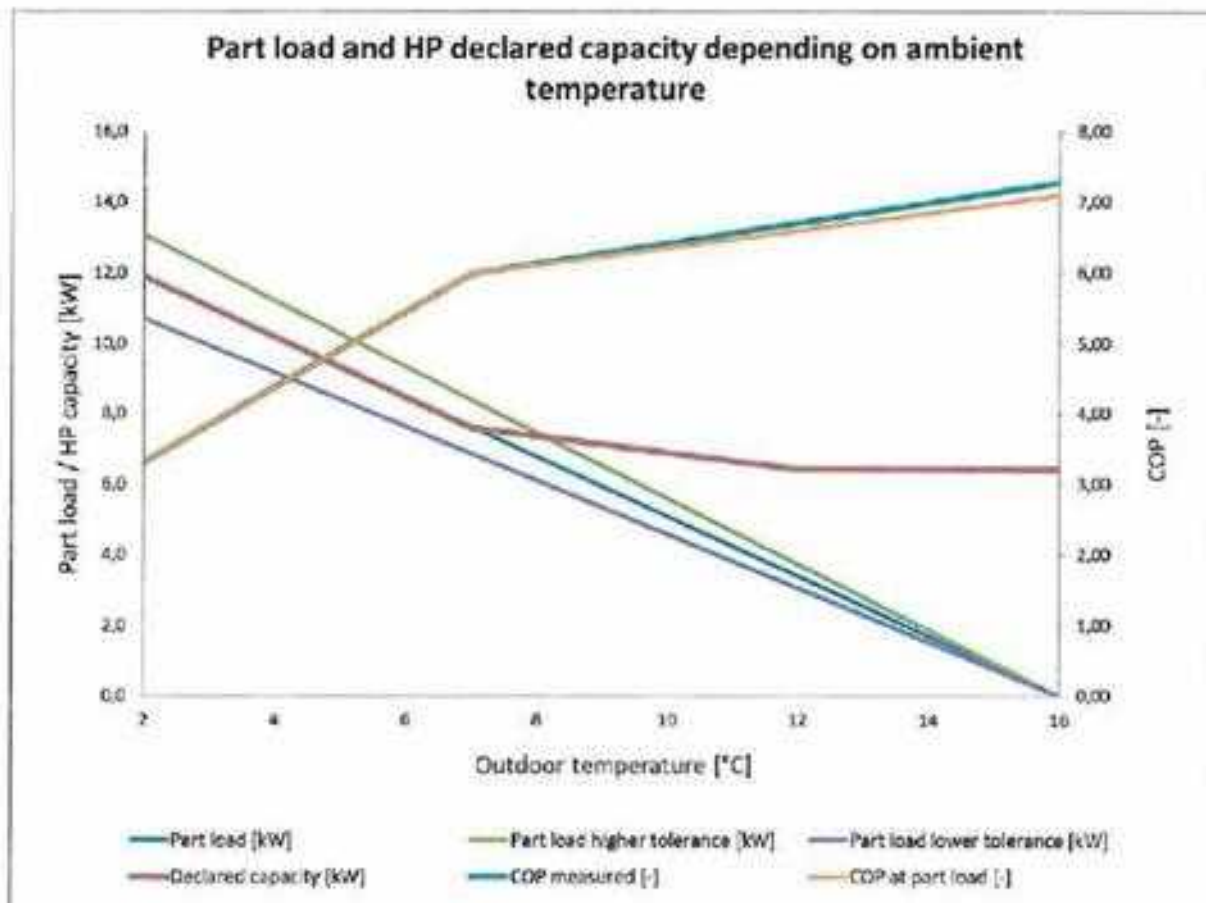
Calculation SCOP, SCOP<sub>on</sub>, SCOP<sub>net</sub>

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

	Bin	Outdoor temp (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (T)	Annual resistive heat	COPbin (T)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	i	T <sub>i</sub>	t <sub>i</sub>		P <sub>HP,i</sub>			elbu <sub>HP,i</sub>	t <sub>i</sub> x elbu <sub>HP,i</sub>	COP <sub>bin</sub> (T)	t <sub>i</sub> x P <sub>HP,i</sub>		t <sub>i</sub> x (P <sub>HP,i</sub> - elbu <sub>HP,i</sub> )	
	[-]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
<b>B, TOL (F), Tdiv (F)</b>	<b>33</b>	<b>2</b>	<b>3</b>	<b>100.00</b>	<b>11.87</b>	<b>11.87</b>	<b>11.87</b>	<b>0.00</b>	<b>0.00</b>	<b>3.31</b>	<b>36</b>	<b>11</b>	<b>36</b>	<b>11</b>
	34	3	22	92.36	11.02	11.01	11.01	0.00	0.00	3.84	242	83	242	83
	35	4	83	85.71	10.17	10.16	10.16	0.00	0.00	4.37	641	147	641	147
	36	5	83	78.57	9.32	9.31	9.31	0.00	0.00	4.91	587	120	587	120
	37	6	175	71.43	8.48	8.45	8.45	0.00	0.00	5.44	1484	273	1484	273
<b>C</b>	<b>38</b>	<b>7</b>	<b>162</b>	<b>64.29</b>	<b>7.63</b>	<b>7.60</b>	<b>7.60</b>	<b>0.00</b>	<b>0.00</b>	<b>5.97</b>	<b>1236</b>	<b>207</b>	<b>1236</b>	<b>207</b>
	39	8	259	57.14	6.78	6.75	6.75	0.00	0.00	6.10	1756	288	1756	288
	40	9	360	50.00	5.93	5.93	5.93	0.00	0.00	6.22	2136	343	2136	343
	41	10	428	42.86	5.09	5.09	5.09	0.00	0.00	6.35	2177	343	2177	343
	42	11	430	35.71	4.24	4.24	4.24	0.00	0.00	6.47	1823	282	1823	282
<b>D</b>	<b>43</b>	<b>12</b>	<b>503</b>	<b>28.57</b>	<b>3.39</b>	<b>3.39</b>	<b>3.39</b>	<b>0.00</b>	<b>0.00</b>	<b>6.60</b>	<b>1706</b>	<b>259</b>	<b>1706</b>	<b>259</b>
	44	13	444	21.43	2.54	2.54	2.54	0.00	0.00	6.72	1129	168	1129	168
	45	14	384	14.29	1.70	1.70	1.70	0.00	0.00	6.85	651	95	651	95
	46	15	234	7.14	0.85	0.85	0.85	0.00	0.00	6.97	249	35	249	35
	<b>Σ</b>		<b>3060</b>							<b>Σ</b>	<b>15853</b>	<b>2633</b>	<b>15853</b>	<b>2633</b>
											SCOP <sub>on</sub>	6.02	SCOP <sub>net</sub>	6.02
													SCOP	5.99

Part load performance diagram

- Low temperature application (reference water temperature 35 °C)
- Reference heating season „W” – warmer



**Data for SCOP calculation**

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

	Outdoor heat exchanger	Indoor heat exchanger	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbin (T)	Eff. power input of compressor off state
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]	[kW]
<b>A</b>	-7	30.00	60.53	11.70	11.700	3.299	0.900	1.00	3.299	–
<b>B</b>	2	27.00	36.84	7.12	7.100	5.235	0.900	1.00	5.235	–
<b>C</b>	7	26.39	23.68	4.58	6.344	6.547	0.984	0.72	6.506	0.0157
<b>D</b>	12	27.45	10.53	2.03	6.679	7.031	0.983	0.31	6.777	0.0157
<b>TOL (E)</b>	-22	35.00	100.00	19.33	8.884	2.350	0.900	1.00	2.350	–
<b>Tbiv (F)</b>	-7	30.00	60.53	11.70	11.700	3.299	0.900	1.00	3.299	–
<b>G</b>	-15	32.00	81.58	15.77	10.359	2.861	0.900	1.00	2.861	–

**Calculation SCOP, SCOP<sub>on</sub>, SCOP<sub>net</sub>**

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

	Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (T)	Annual resistive heat	COPbin (T)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
	I	T <sub>i</sub>	h <sub>i</sub>	P <sub>LRi</sub>	P <sub>LRi</sub>			elbu <sub>o</sub>	h <sub>i</sub> x elbu <sub>o</sub>	COP bin (T)	h <sub>i</sub> x P <sub>LRi</sub>		h <sub>i</sub> x (P <sub>LRi</sub> - elbu <sub>o</sub> )	
	[-]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
TOL (E)	9	-22	1	100.00	19.33	8.88	8.88	10.45	10.45	2.35	19	14	9	4
	10	-21	6	97.37	18.82	9.09	9.09	9.73	68.36	2.42	113	81	55	23
	11	-20	13	94.74	18.31	9.31	9.31	9.01	117.10	2.50	258	160	121	48
	12	-19	17	92.11	17.80	9.52	9.52	8.29	140.90	2.57	303	204	102	63
	13	-18	19	89.47	17.30	9.73	9.73	7.57	143.81	2.64	329	214	105	70
	14	-17	26	86.84	16.79	9.94	9.94	6.85	178.08	2.72	436	273	258	95
	15	-16	39	84.21	16.28	10.15	10.15	6.13	236.06	2.79	635	381	396	142
G	16	-15	41	81.58	15.77	10.36	10.36	5.41	221.83	2.88	647	370	425	148
	17	-14	35	78.95	15.26	10.53	10.53	4.73	165.69	2.92	534	292	368	128
	18	-13	52	76.32	14.75	10.69	10.69	4.06	211.00	2.97	767	398	556	187
	19	-12	37	73.69	14.24	10.86	10.86	3.38	126.11	3.03	527	258	402	133

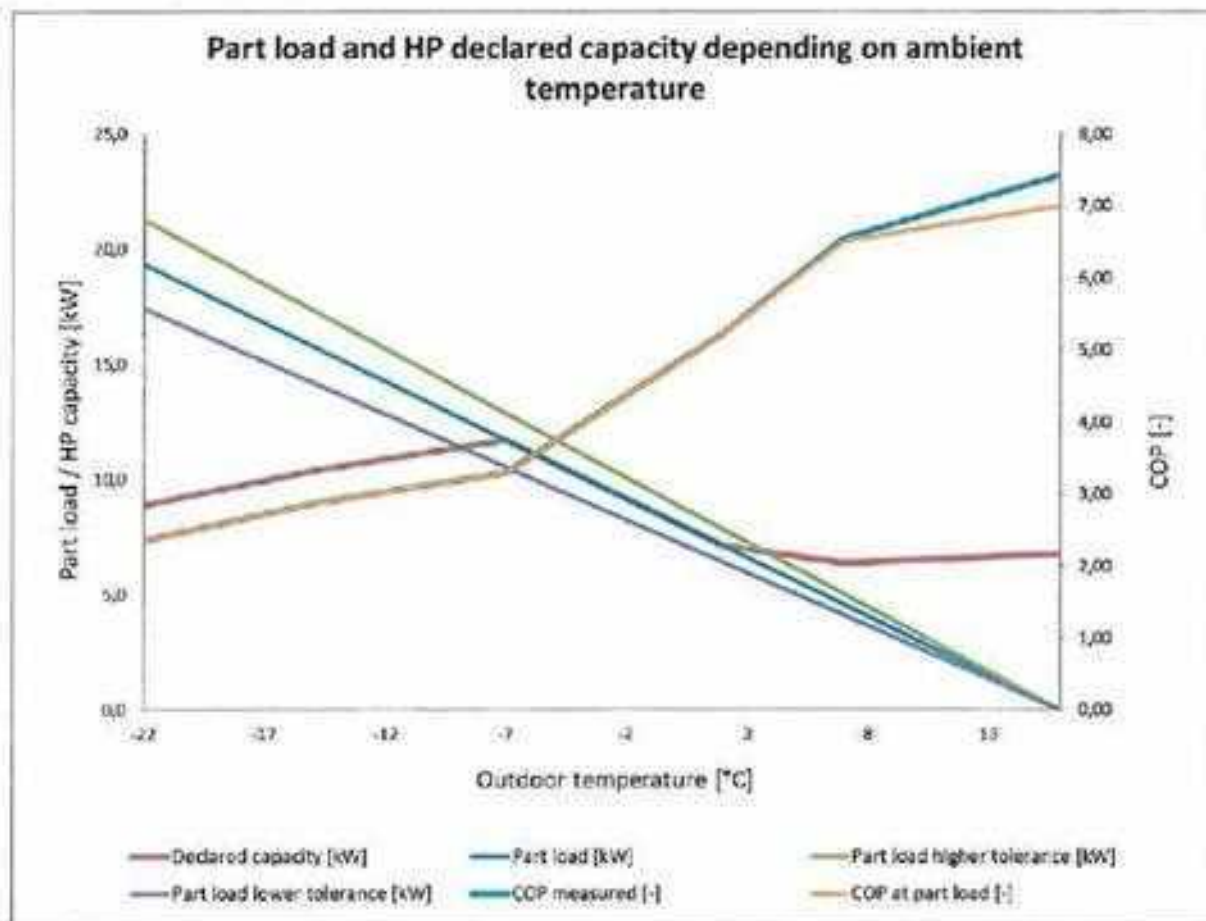


	20	-11	41	71.05	13.73	11.03	11.00	2.71	110.01	3.08	553	258	452	147
	21	-10	43	68.42	13.23	11.20	11.20	2.03	87.24	3.13	599	241	481	154
	22	-9	54	65.79	12.72	11.36	11.36	1.35	73.04	3.19	687	265	614	192
	23	-8	60	63.16	12.21	11.53	11.53	0.68	60.87	3.24	1009	381	1038	320
<b>A</b>	<b>24</b>	<b>-7</b>	<b>125</b>	<b>60.53</b>	<b>11.70</b>	<b>11.70</b>	<b>11.70</b>	<b>0.00</b>	<b>0.00</b>	<b>3.30</b>	<b>1463</b>	<b>443</b>	<b>1463</b>	<b>443</b>
	25	-6	169	57.90	11.10	11.10	11.10	0.00	0.00	3.31	1801	638	1801	638
	26	-5	195	55.28	10.68	10.68	10.68	0.00	0.00	3.73	2083	659	2083	659
	27	-4	278	52.93	10.17	10.17	10.17	0.00	0.00	3.94	2628	717	2628	717
	28	-3	306	50.00	9.67	9.66	9.66	0.00	0.00	4.16	2958	711	2958	711
	29	-2	454	47.37	9.16	9.14	9.14	0.00	0.00	4.37	4157	950	4157	950
	30	-1	365	44.74	8.65	8.63	8.63	0.00	0.00	4.59	3329	726	3329	726
	31	0	490	42.11	8.14	8.12	8.12	0.00	0.00	4.80	3988	830	3988	830
	32	1	535	39.47	7.63	7.61	7.61	0.00	0.00	5.02	4067	810	4067	810
<b>B</b>	<b>33</b>	<b>2</b>	<b>390</b>	<b>36.84</b>	<b>7.12</b>	<b>7.10</b>	<b>7.10</b>	<b>0.00</b>	<b>0.00</b>	<b>5.24</b>	<b>2706</b>	<b>517</b>	<b>2706</b>	<b>517</b>
	34	3	226	34.21	6.61	6.56	6.61	0.00	0.00	5.49	1508	275	1508	275
	35	4	261	31.56	6.10	6.00	6.10	0.00	0.00	5.74	1503	277	1503	277
	36	5	270	28.95	5.60	6.66	6.60	0.00	0.00	6.00	1501	260	1501	260
	37	6	229	26.32	5.09	6.50	6.09	0.00	0.00	6.25	1105	186	1165	186
<b>C</b>	<b>38</b>	<b>7</b>	<b>269</b>	<b>23.68</b>	<b>4.58</b>	<b>6.34</b>	<b>4.58</b>	<b>0.00</b>	<b>0.00</b>	<b>6.51</b>	<b>1232</b>	<b>189</b>	<b>1232</b>	<b>189</b>
	39	8	233	21.05	4.07	6.39	4.07	0.00	0.00	6.56	948	145	948	145
	40	9	230	18.42	3.56	6.44	3.56	0.00	0.00	6.51	819	124	819	124
	41	10	243	15.79	3.05	6.48	3.05	0.00	0.00	6.67	742	111	742	111
	42	11	191	13.16	2.54	6.53	2.54	0.00	0.00	6.72	496	72	496	72
<b>D</b>	<b>43</b>	<b>12</b>	<b>146</b>	<b>10.53</b>	<b>2.03</b>	<b>6.58</b>	<b>2.03</b>	<b>0.00</b>	<b>0.00</b>	<b>6.78</b>	<b>297</b>	<b>44</b>	<b>297</b>	<b>44</b>
	44	13	150	7.89	1.53	6.63	1.53	0.00	0.00	6.83	229	34	229	34
	45	14	97	5.26	1.02	6.67	1.02	0.00	0.00	6.89	99	14	99	14
	46	15	61	2.63	0.51	6.72	0.51	0.00	0.00	6.94	31	4	31	4
<b>Σ</b>			<b>6446</b>								<b>Σ</b>	<b>47645</b>	<b>12333</b>	<b>45701</b>

SCOP <sub>on</sub>	3.86	SCOP <sub>net</sub>	4.40
		SCOP	3.86

Part load performance diagram

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



Data for SCOP calculation

- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „W” – warmer

	Outdoor heat exchanger	Indoor heat exchanger	Part load ratio	Part load	DC Declared capacity	COPd at declared capacity	Cdh degradation coefficient	CR	COPbln (T)	Eff. power input of compressor off state
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]								
<b>A</b>	–	–	–	–	–	–	–	–	–	–
<b>B</b>	2	55.00	100.00	12.46	12.463	2.459	0.900	1.00	2.459	–
<b>C</b>	7	46.00	64.29	8.01	8.000	4.367	0.900	1.00	4.367	–
<b>D</b>	12	37.33	28.57	3.56	6.101	5.158	0.987	0.58	5.110	0.0157
<b>TOL (E)</b>	2	55.00	100.00	12.46	12.463	2.459	0.900	1.00	2.459	–
<b>Tblv (F)</b>	2	55.00	100.00	12.46	12.463	2.459	0.900	1.00	2.459	–



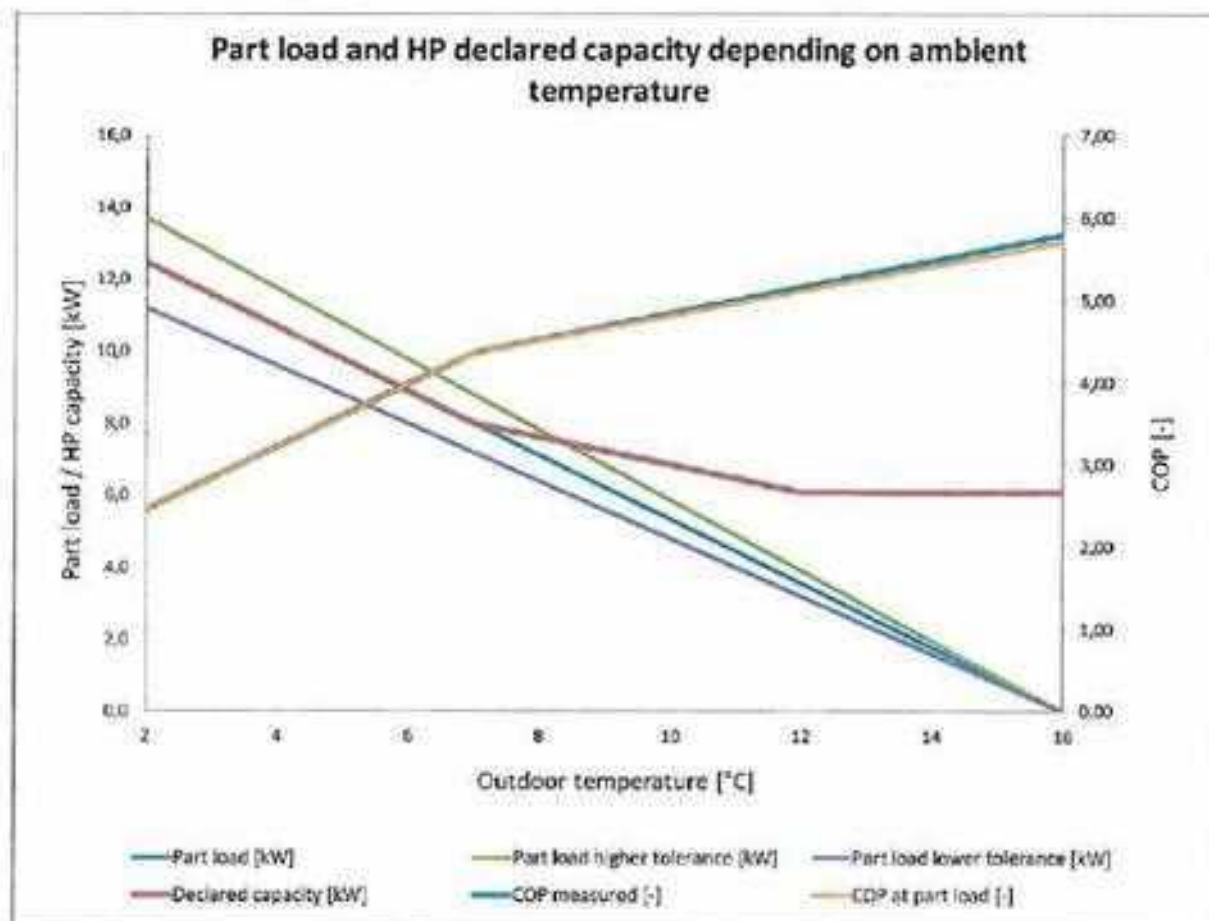
Calculation SCOP, SCOP<sub>on</sub>, SCOP<sub>net</sub>

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

Bín	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
J	Tj	h		P <sub>q,b</sub>			elbu <sub>q</sub>	h × elbu <sub>q</sub>	COP <sub>bin</sub> (Tj)	h × P <sub>q,b</sub>		h × (P <sub>q,b</sub> - elbu <sub>q</sub> )	
[-]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
<b>B, TOL (E), Tolv (F)</b>	<b>33</b>	<b>2</b>	<b>3</b>	<b>100.00</b>	<b>12.46</b>	<b>12.46</b>	<b>0.00</b>	<b>0.00</b>	<b>2.46</b>	<b>37</b>	<b>15</b>	<b>37</b>	<b>15</b>
	34	3	22	92.86	11.57	11.57	0.00	0.00	2.54	255	90	265	90
	35	4	63	85.71	10.68	10.68	0.00	0.00	3.22	673	209	673	209
	36	5	63	76.57	9.79	9.79	0.00	0.00	3.60	617	171	617	171
	37	6	175	71.43	8.90	8.89	0.00	0.00	3.99	1556	391	1556	391
<b>C</b>	<b>38</b>	<b>7</b>	<b>162</b>	<b>64.29</b>	<b>8.01</b>	<b>8.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.37</b>	<b>1298</b>	<b>297</b>	<b>1298</b>	<b>297</b>
	39	8	259	57.14	7.12	7.02	0.00	0.00	4.52	1845	400	1845	400
	40	9	360	50.00	6.23	6.23	0.00	0.00	4.66	2243	481	2243	481
	41	10	428	42.86	5.34	5.34	0.00	0.00	4.81	2286	475	2286	475
	42	11	430	35.71	4.45	4.45	0.00	0.00	4.96	1914	386	1914	386
<b>D</b>	<b>43</b>	<b>12</b>	<b>503</b>	<b>28.57</b>	<b>3.56</b>	<b>3.56</b>	<b>0.00</b>	<b>0.00</b>	<b>5.11</b>	<b>1791</b>	<b>351</b>	<b>1791</b>	<b>351</b>
	44	13	444	21.43	2.67	2.67	0.00	0.00	5.26	1186	225	1186	225
	45	14	334	14.29	1.78	1.78	0.00	0.00	5.41	684	126	684	126
	46	15	294	7.14	0.89	0.89	0.00	0.00	5.56	262	47	262	47
	<b>Σ</b>	<b>3390</b>							<b>Σ</b>	<b>16648</b>	<b>3573</b>	<b>16648</b>	<b>3573</b>
										SCOP <sub>on</sub>	4.53	SCOP <sub>net</sub>	4.53
												SCOP	4.52

Part load performance diagram

- Medium temperature application (reference water temperature 55 °C)
- Reference heating season „W” – warmer



**Data for SCOP calculation**

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

	Outdoor heat exchanger	Indoor heat exchanger	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
	Outdoor air inlet	Outlet water temperature								
	[°C]	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]	[kW]
<b>A</b>	-7	44.00	60.53	11.56	11.560	2.624	0.900	1.00	2.624	–
<b>B</b>	2	37.00	36.84	7.04	7.000	4.321	0.900	1.00	4.321	–
<b>C</b>	7	34.25	23.68	4.52	6.296	5.480	0.986	0.72	5.451	0.0157
<b>D</b>	12	33.46	10.53	2.01	6.324	5.701	0.986	0.32	5.533	0.0157
<b>TOL (E)</b>	-22	55.00	100.00	19.10	8.865	1.723	0.900	1.00	1.723	–
<b>Tbiv (F)</b>	-7	44.00	60.53	11.56	11.560	2.624	0.900	1.00	2.624	–
<b>G</b>	-15	49.00	81.58	15.58	9.983	2.129	0.900	1.00	2.129	–

**Calculation SCOP, SCOP<sub>on</sub>, SCOP<sub>net</sub>**

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

Bin	Outdoor temp. (dry bulb)	Hours	Part load ratio	Heat load	Capacity of HP	Heat load covered by heat pump	Resistive heat elbu (Tj)	Annual resistive heat	COPbin (Tj)	Annual heating demand	Annual power input including electric back up heating	Net annual heating capacity	Net annual power input without electric back up heating
j	Tj	h	[%]	P <sub>he,j</sub>	[kW]	[kW]	elbu <sub>he,j</sub>	h <sub>j</sub> x elbu <sub>he,j</sub>	COP bin (Tj)	h <sub>j</sub> x P <sub>he,j</sub>	[kWh]	h <sub>j</sub> x (P <sub>he,j</sub> - elbu <sub>he,j</sub> )	[kWh]
[-]	[°C]	[h]	[%]	[kW]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
<b>TOL (E)</b>	9	-22	1	100.00	19.10	8.87	8.87	10.23	1.72	19	15	9	5
	10	-21	6	97.37	18.60	9.02	9.02	57.43	1.78	112	88	54	30
	11	-20	13	94.74	18.09	9.18	9.18	115.82	1.84	238	181	119	65
	12	-19	17	92.11	17.59	9.34	9.34	140.20	1.90	290	224	169	84
	13	-18	19	89.47	17.09	9.50	9.50	144.11	1.95	326	238	181	92
	14	-17	26	86.84	16.59	9.66	9.66	179.98	2.01	431	305	261	125
	15	-16	29	84.21	16.08	9.82	9.82	244.14	2.07	527	429	383	185
<b>G</b>	16	-15	41	81.58	15.58	9.98	9.98	229.51	2.13	639	422	409	192
	17	-14	39	78.96	15.08	10.18	10.18	171.43	2.19	528	334	356	163
	18	-13	52	76.32	14.58	10.38	10.38	218.31	2.25	758	458	540	240
	19	-12	37	73.68	14.07	10.57	10.57	129.45	2.31	521	298	301	180

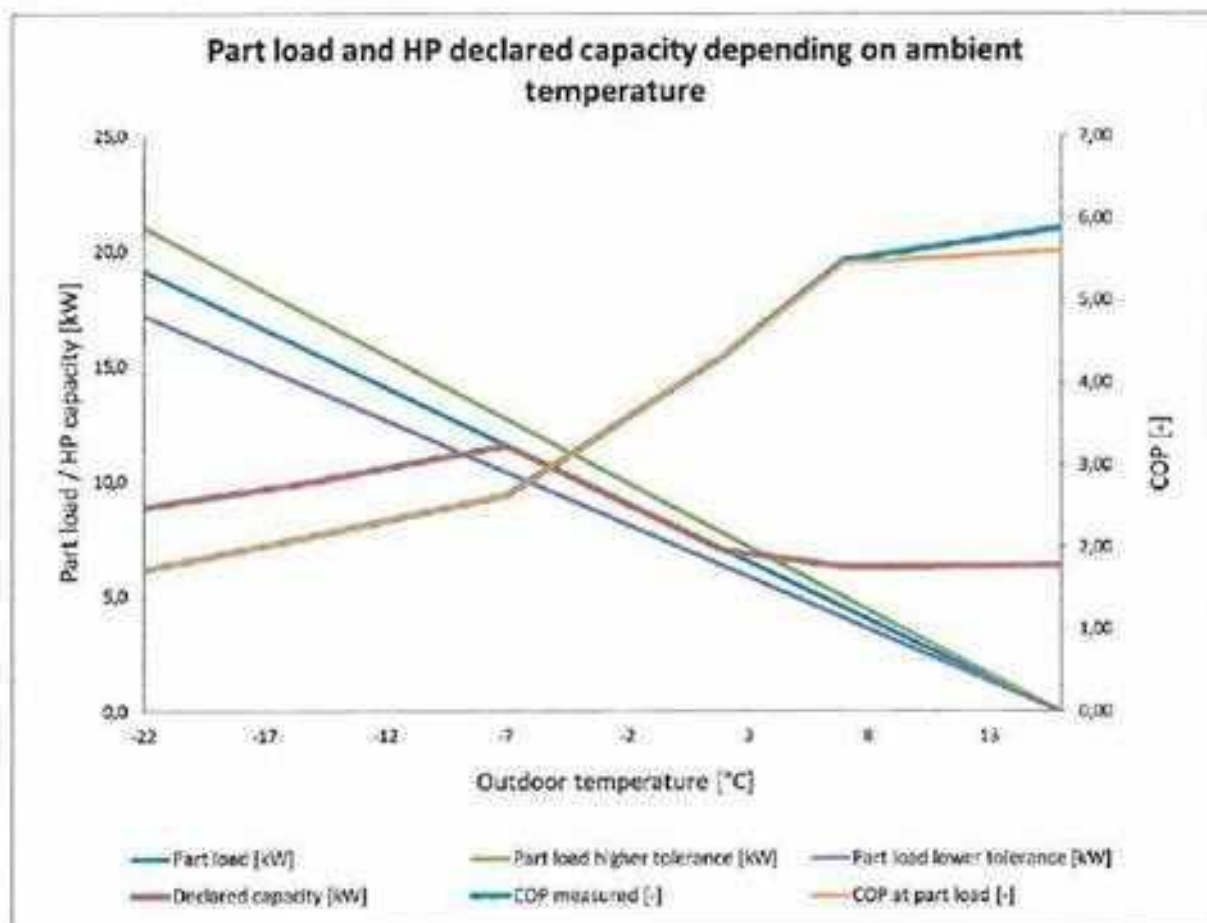


	20	-11	41	71.05	13.57	10.77	10.77	2.80	114.78	2.38	586	301	442	100
	21	-10	43	68.42	13.07	10.97	10.97	2.10	90.26	2.44	582	284	472	103
	22	-9	54	65.79	12.57	11.17	11.17	1.40	75.57	2.50	679	317	603	241
	23	-8	90	63.18	12.06	11.38	11.38	0.70	62.08	2.56	1086	462	1023	369
A Tbiv (F)	24	-7	125	60.53	11.56	11.56	11.56	0.00	0.00	2.62	1445	551	1445	551
	25	-6	189	57.89	11.06	11.05	11.05	0.00	0.00	2.81	1869	664	1869	664
	26	-5	195	55.26	10.55	10.55	10.55	0.00	0.00	3.00	2058	686	2058	686
	27	-4	275	52.83	10.05	10.04	10.04	0.00	0.00	3.19	2795	876	2795	876
	28	-3	308	50.00	9.55	9.53	9.53	0.00	0.00	3.38	2922	866	2922	866
	29	-2	454	47.37	9.05	9.03	9.03	0.00	0.00	3.57	4107	1152	4107	1152
	30	-1	385	44.74	8.54	8.52	8.52	0.00	0.00	3.76	3290	876	3290	876
	31	0	490	42.11	8.04	8.01	8.01	0.00	0.00	3.94	3940	996	3940	999
	32	1	533	39.47	7.54	7.51	7.51	0.00	0.00	4.13	4018	972	4018	972
B	33	2	380	36.84	7.04	7.00	7.00	0.00	0.00	4.32	2674	619	2674	619
	34	3	228	34.21	6.53	6.48	6.53	0.00	0.00	4.55	1490	328	1490	328
	35	4	261	31.58	6.03	6.72	6.03	0.00	0.00	4.77	1574	330	1574	330
	36	5	279	28.95	5.53	6.58	5.53	0.00	0.00	5.00	1543	309	1543	309
	37	6	229	26.32	5.03	6.44	5.03	0.00	0.00	5.22	1151	220	1151	220
C	38	7	269	23.68	4.52	6.38	4.52	0.00	0.00	5.45	1217	223	1217	223
	39	8	233	21.05	4.02	6.30	4.02	0.00	0.00	5.47	937	171	937	171
	40	9	230	18.42	3.52	6.31	3.52	0.00	0.00	5.48	809	148	809	148
	41	10	243	15.79	3.02	6.31	3.02	0.00	0.00	5.60	733	133	733	133
	42	11	191	13.16	2.51	6.32	2.51	0.00	0.00	5.52	460	87	480	87
D	43	12	146	10.53	2.01	6.32	2.01	0.00	0.00	5.53	294	53	294	53
	44	13	150	7.89	1.51	6.33	1.51	0.00	0.00	5.55	226	41	226	41
	45	14	97	5.26	1.01	6.34	1.01	0.00	0.00	5.57	98	18	98	18
	46	15	61	2.63	0.50	6.34	0.50	0.00	0.00	5.68	31	5	31	5
I			8445							I	47075	14879	45091	12605

SCOPon	3.21	SCOPnet	3.55
		SCOP	3.21

Part load performance diagram

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



Tested by: Ing. Tomáš Sedláček

Date: 2024-01-30

Signed:

Reviewed and approved by: Ing. Michal Faltýnek

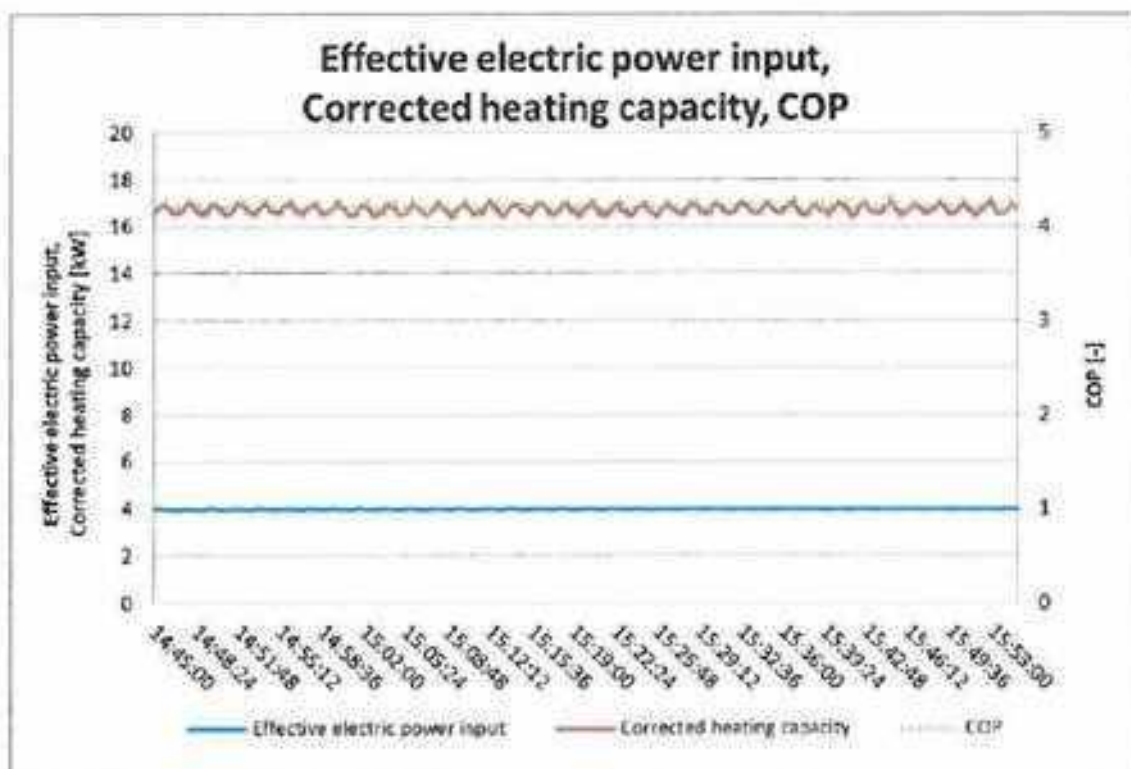
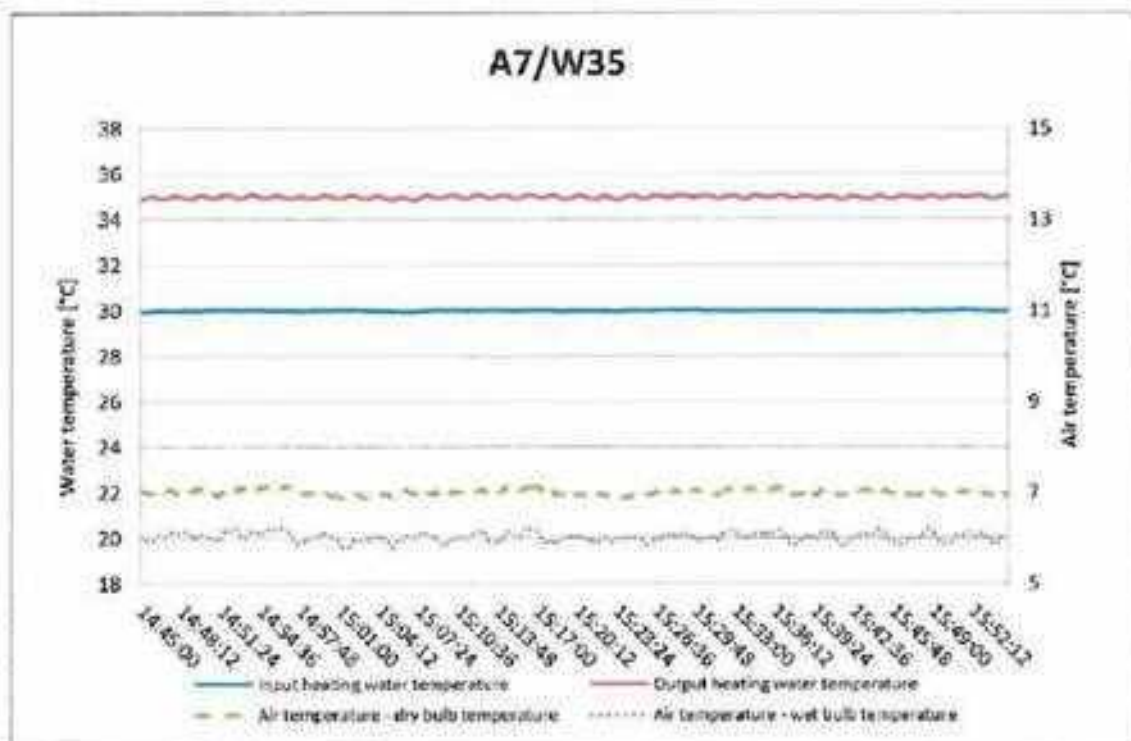
Date: 2024-01-30

Signed:

#### IV. Graphs

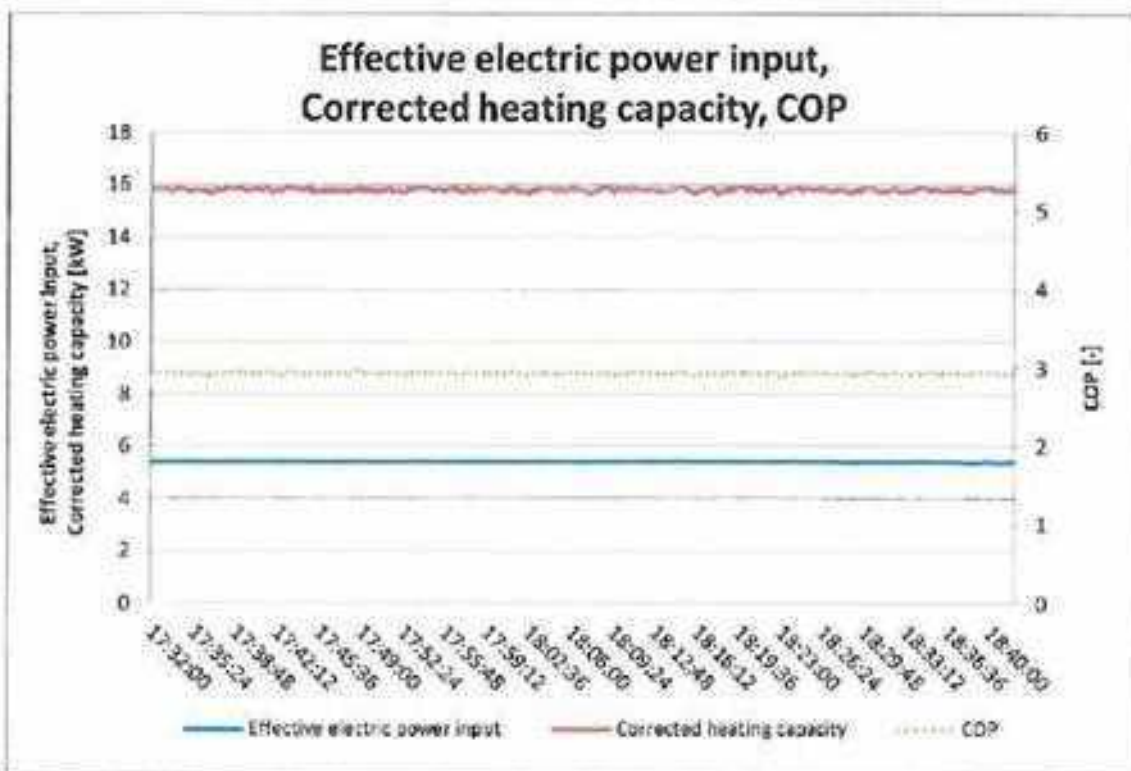
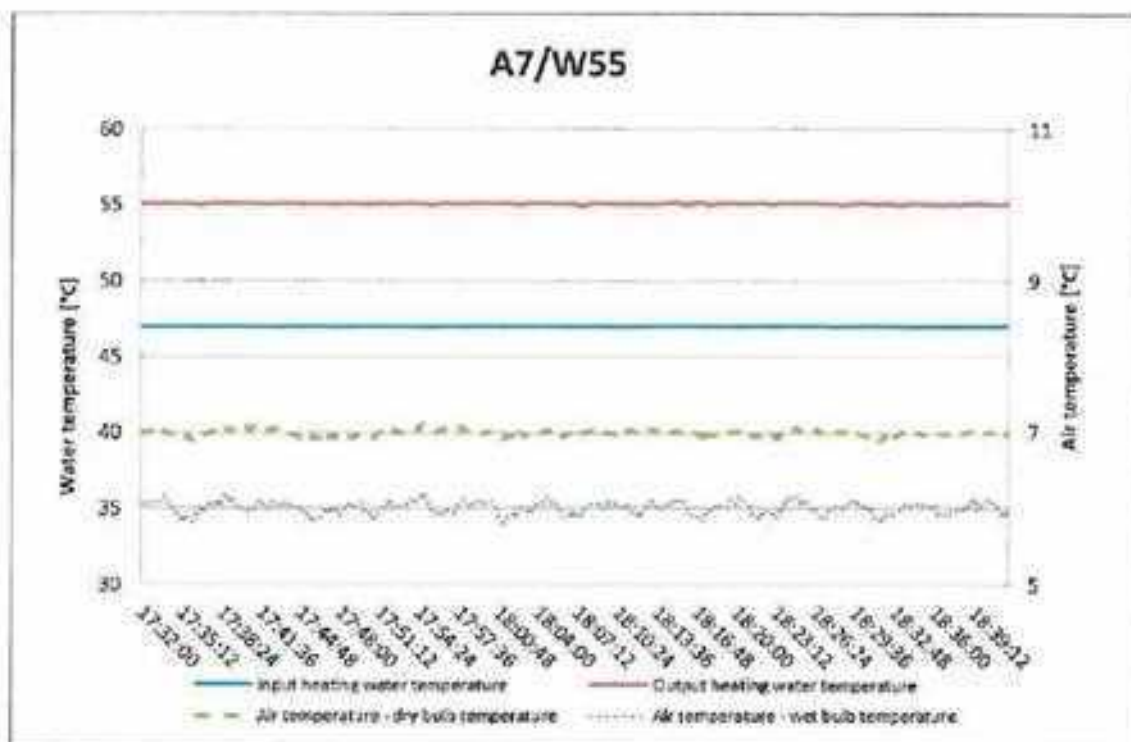
##### 1. Rating conditions

A7/W35 (95 rps)



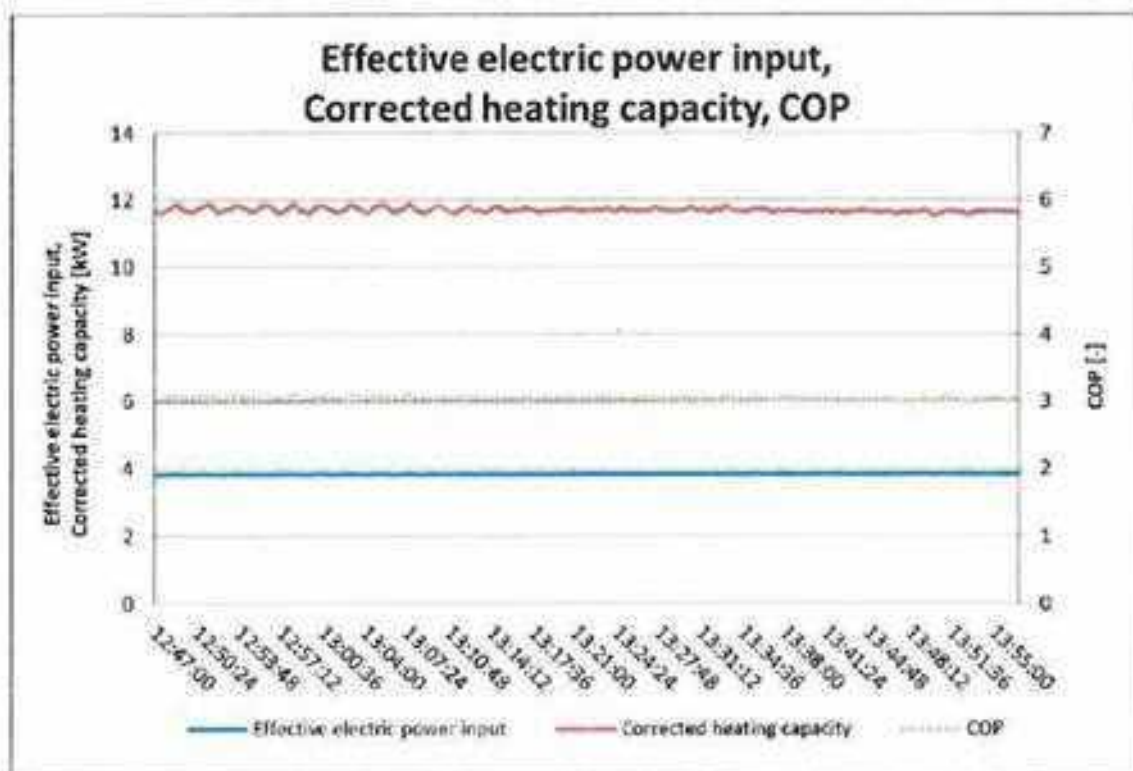
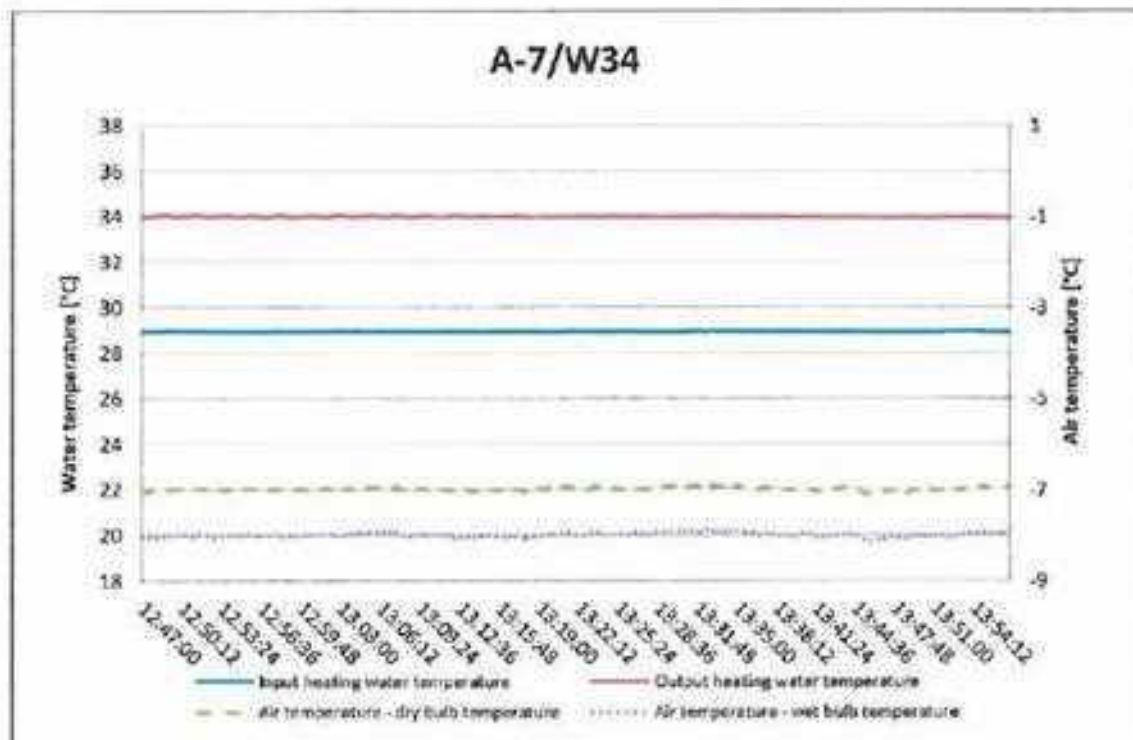


A7/W55 (95 rps)

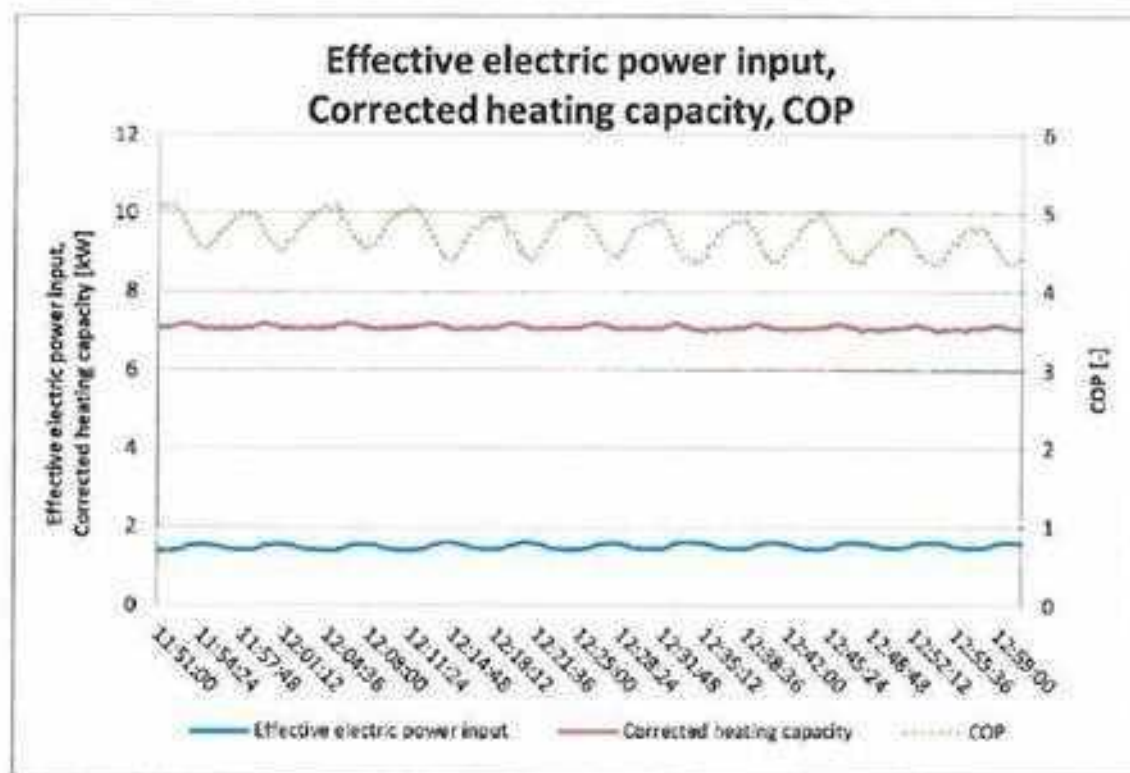
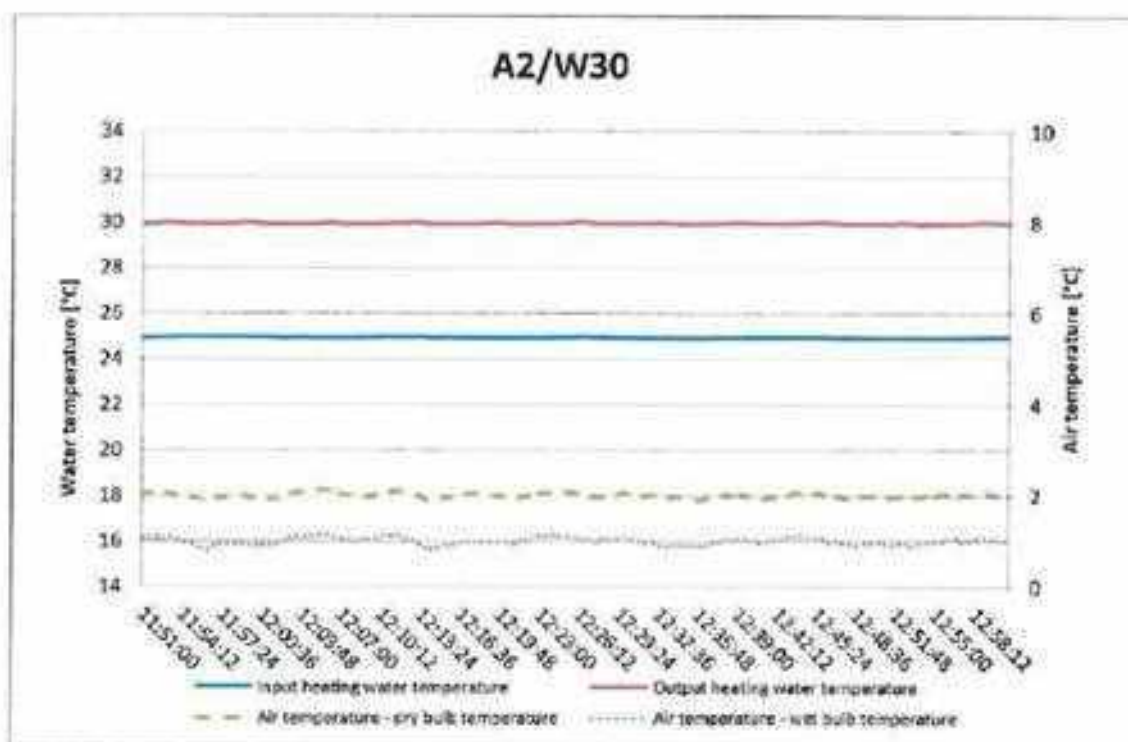


## 2. Seasonal performance tests and SCOP calculation – Low temperature application

A-7/W34 (95 rps)

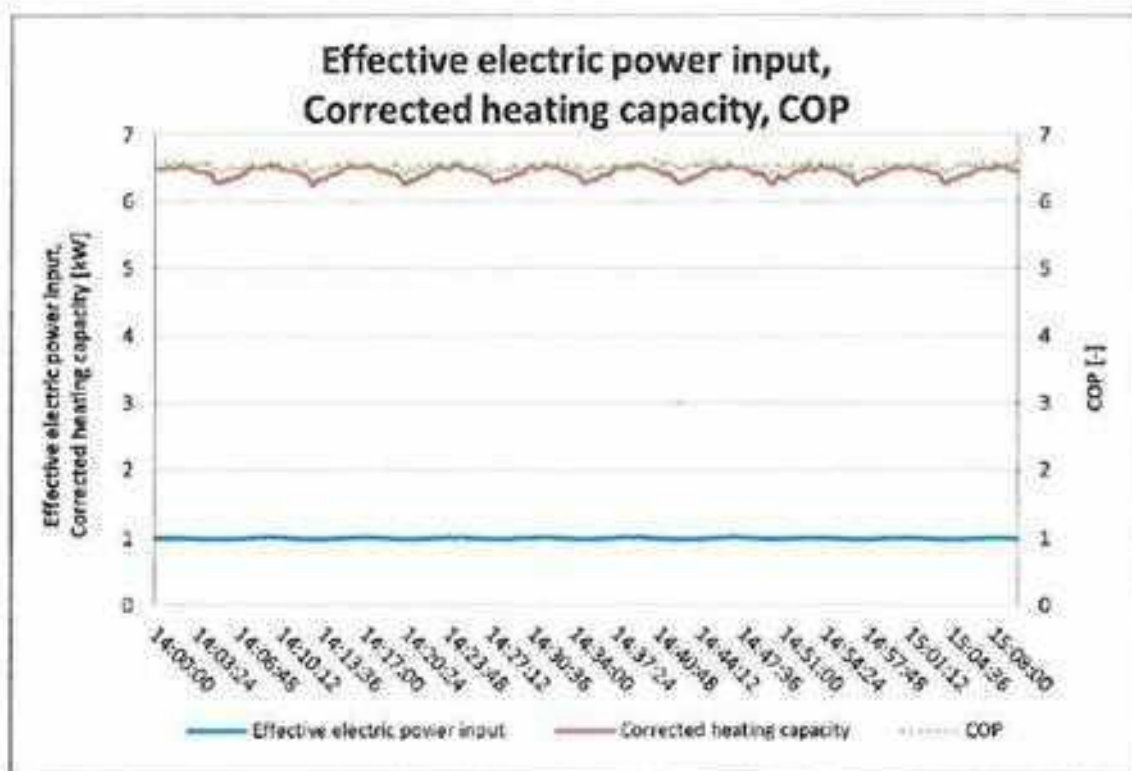
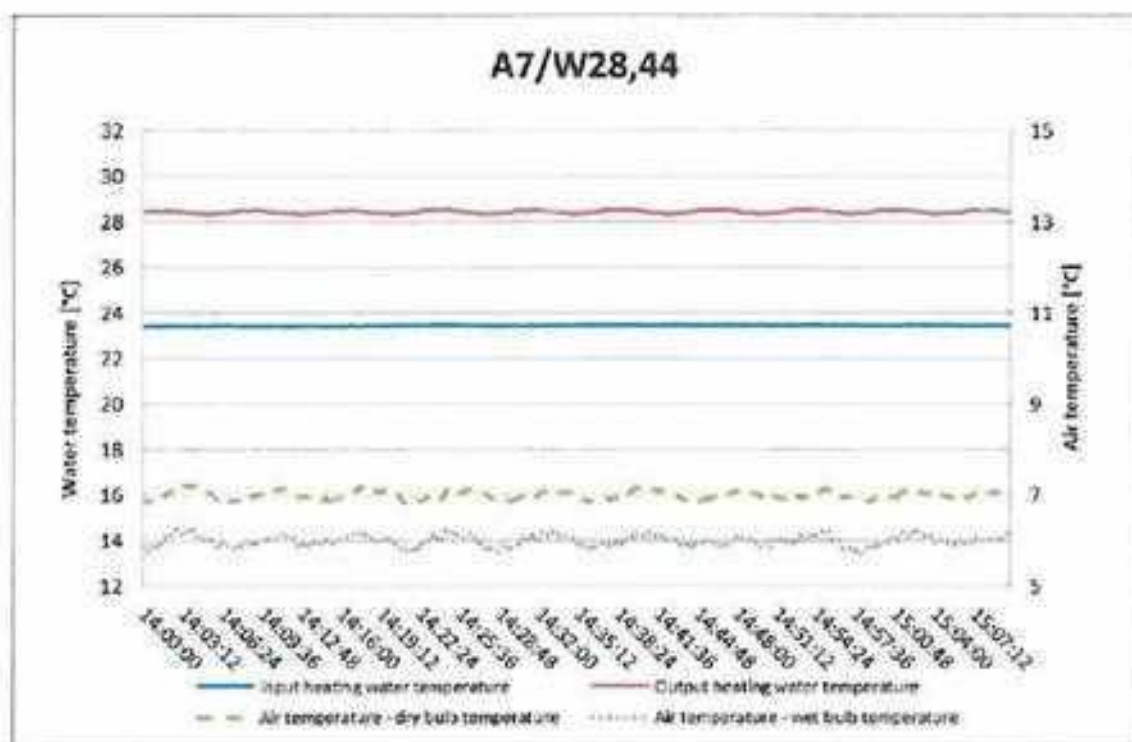


A2/W30 (43 rps)

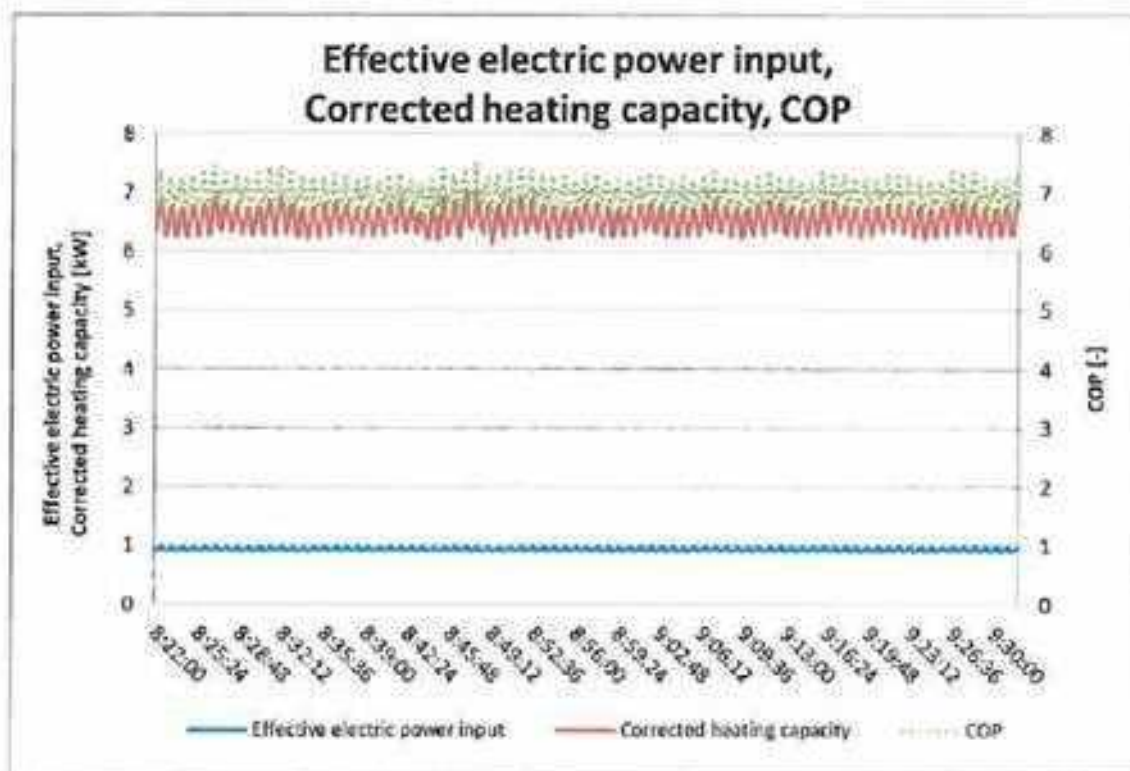
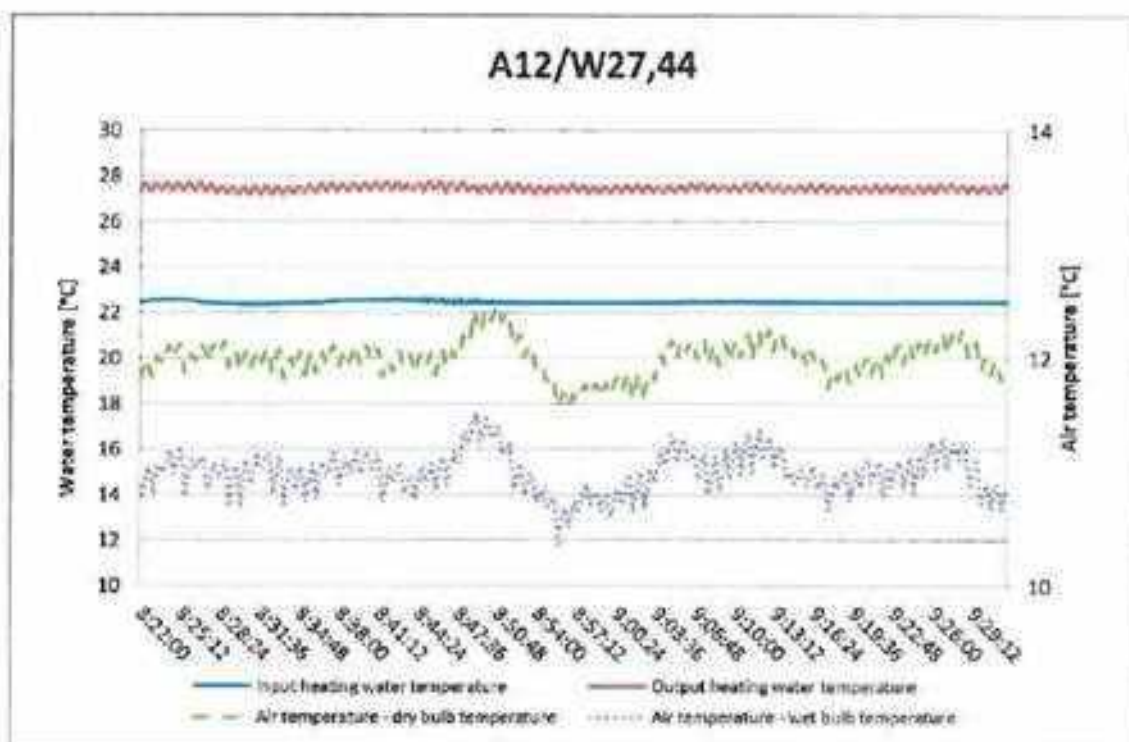




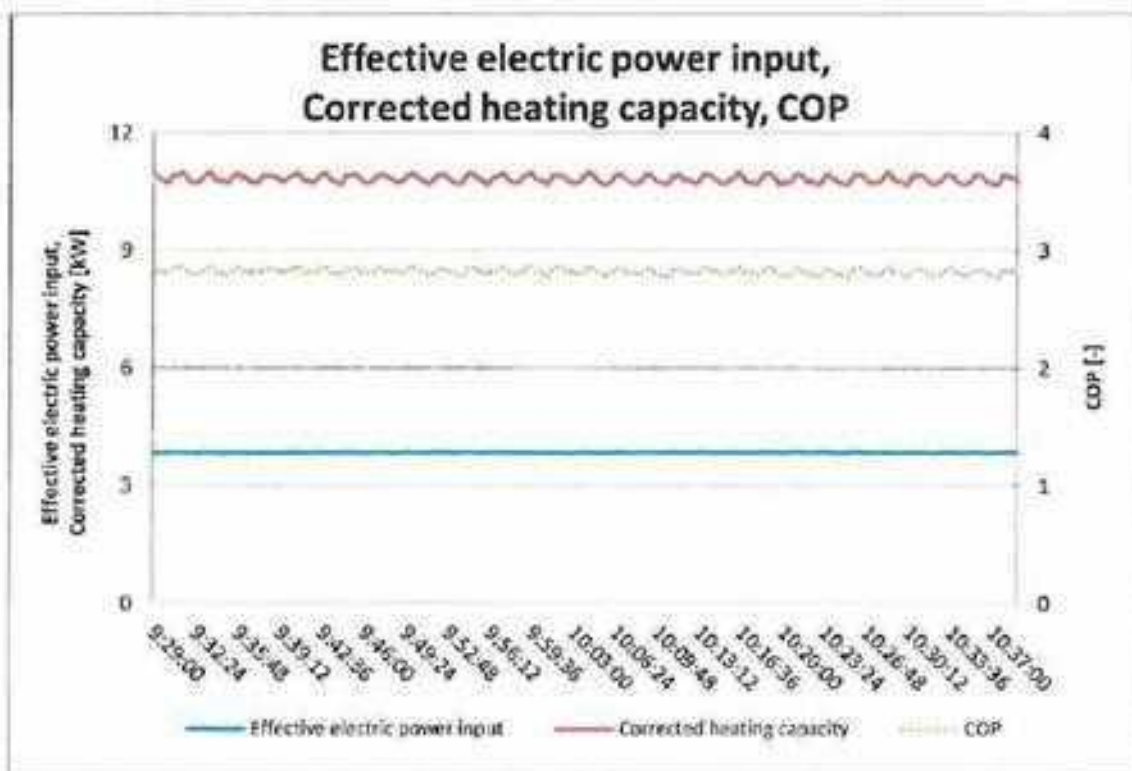
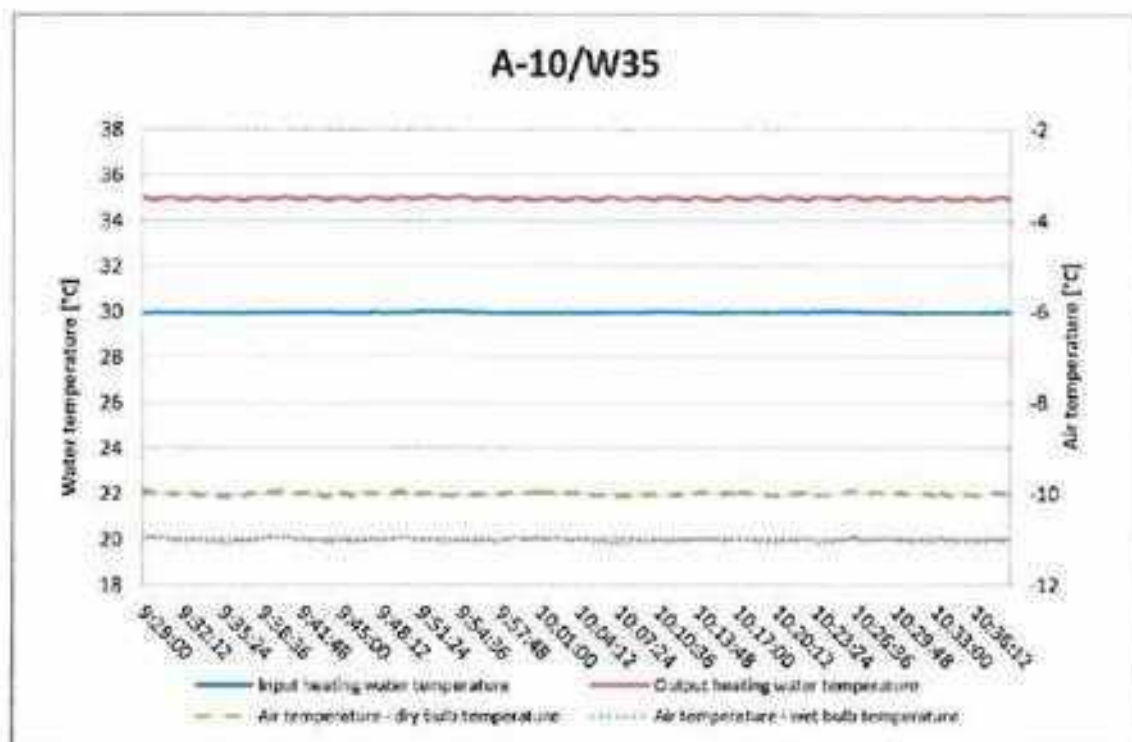
A7/W28.44 (35 rps)



A12/W27.44 (35rps)



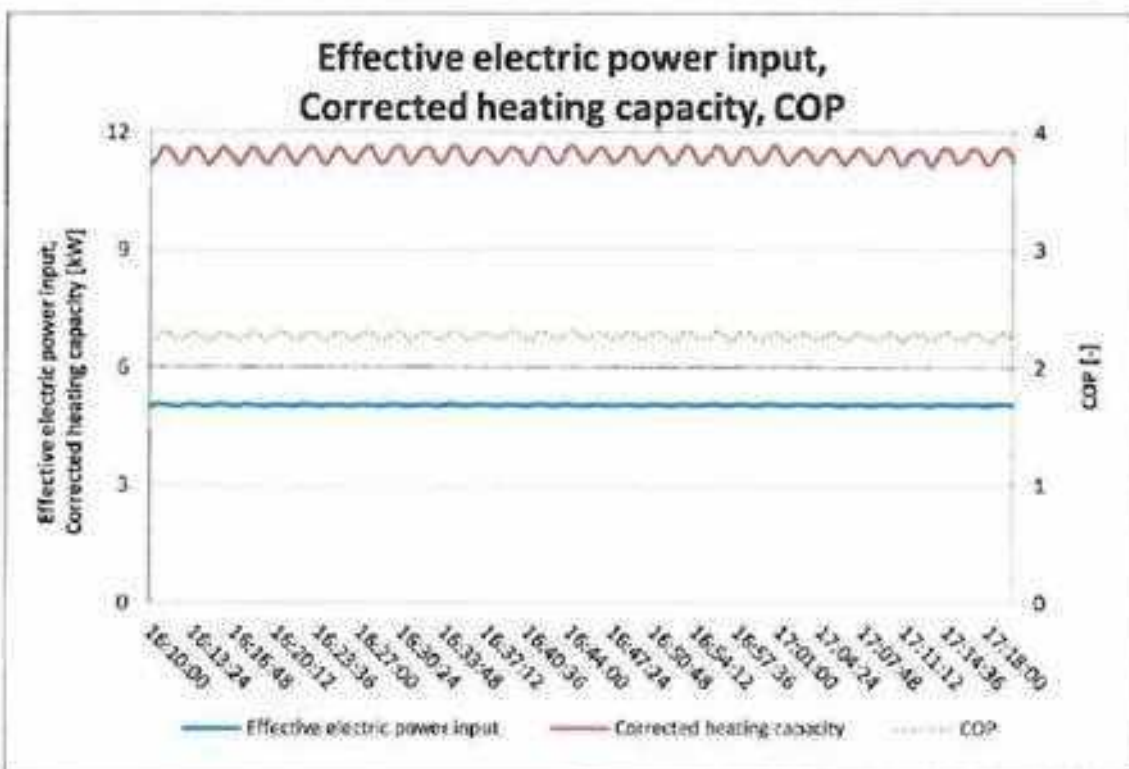
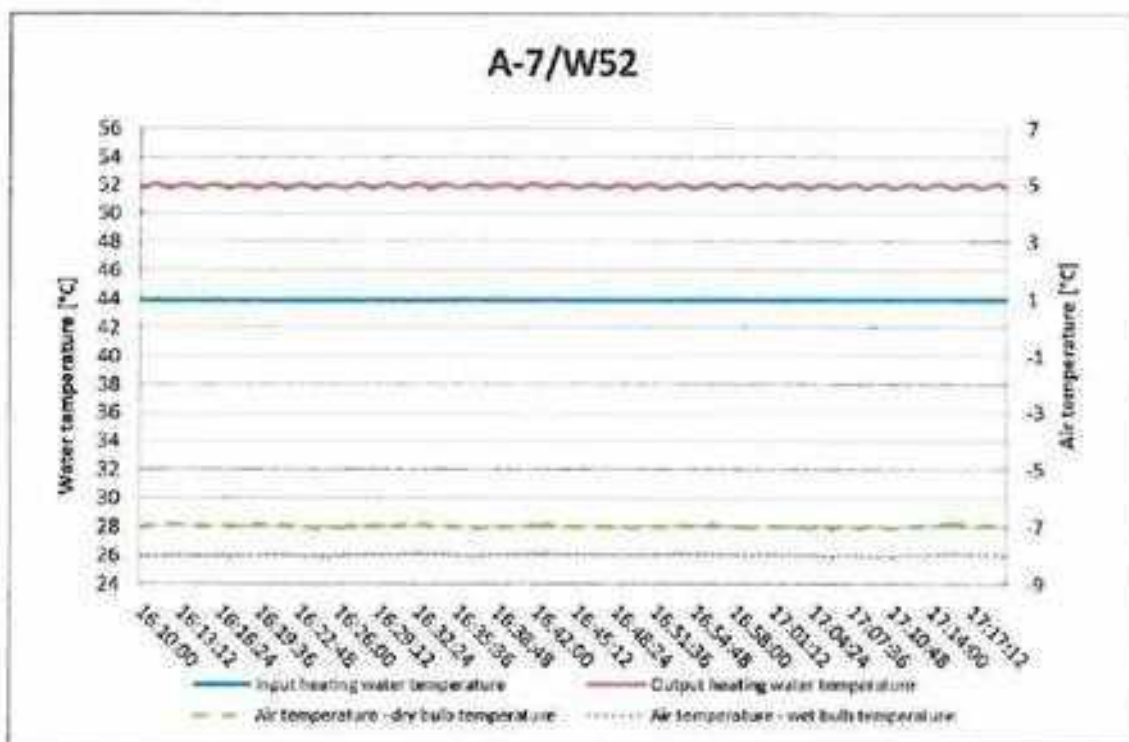
A-10/W35 (95 rps)



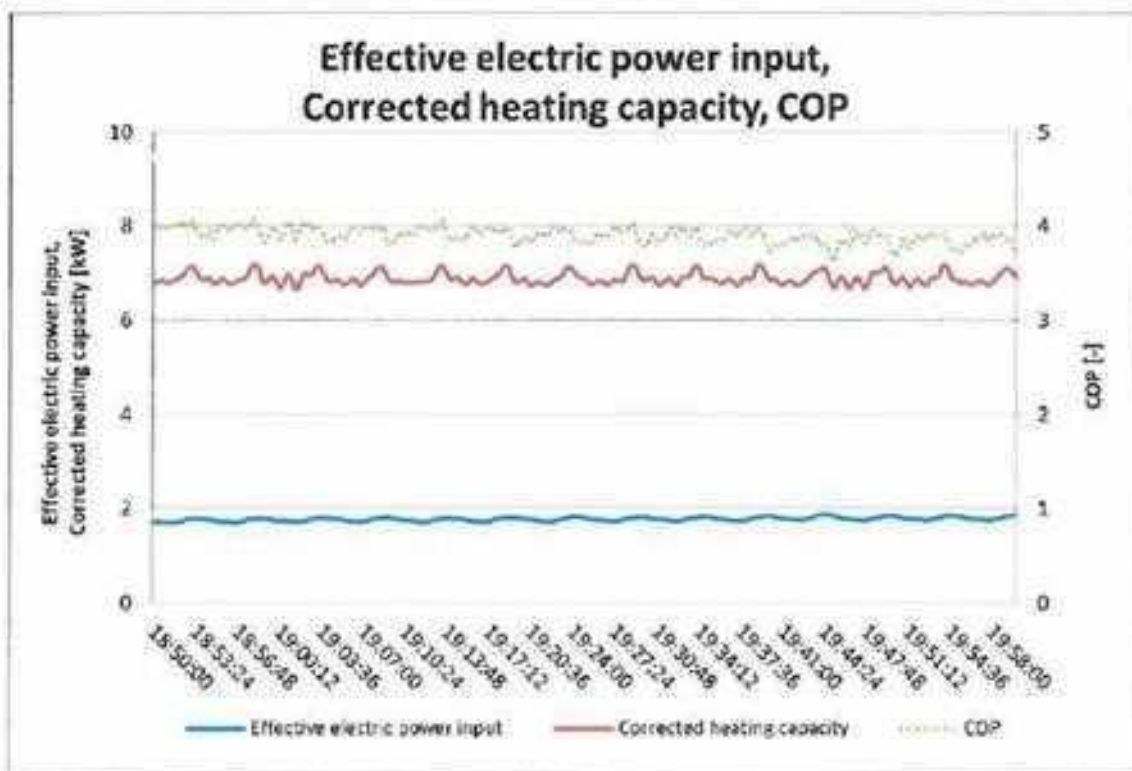
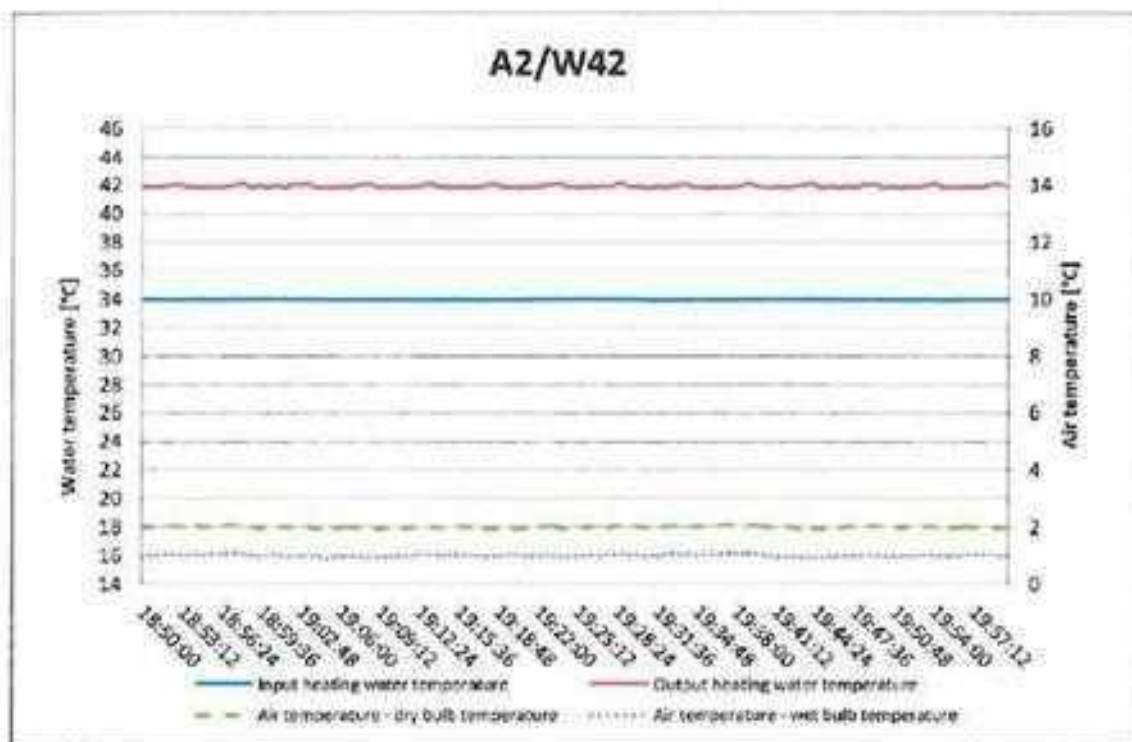


### 3. Seasonal performance tests and SCOP calculation – Medium temperature application

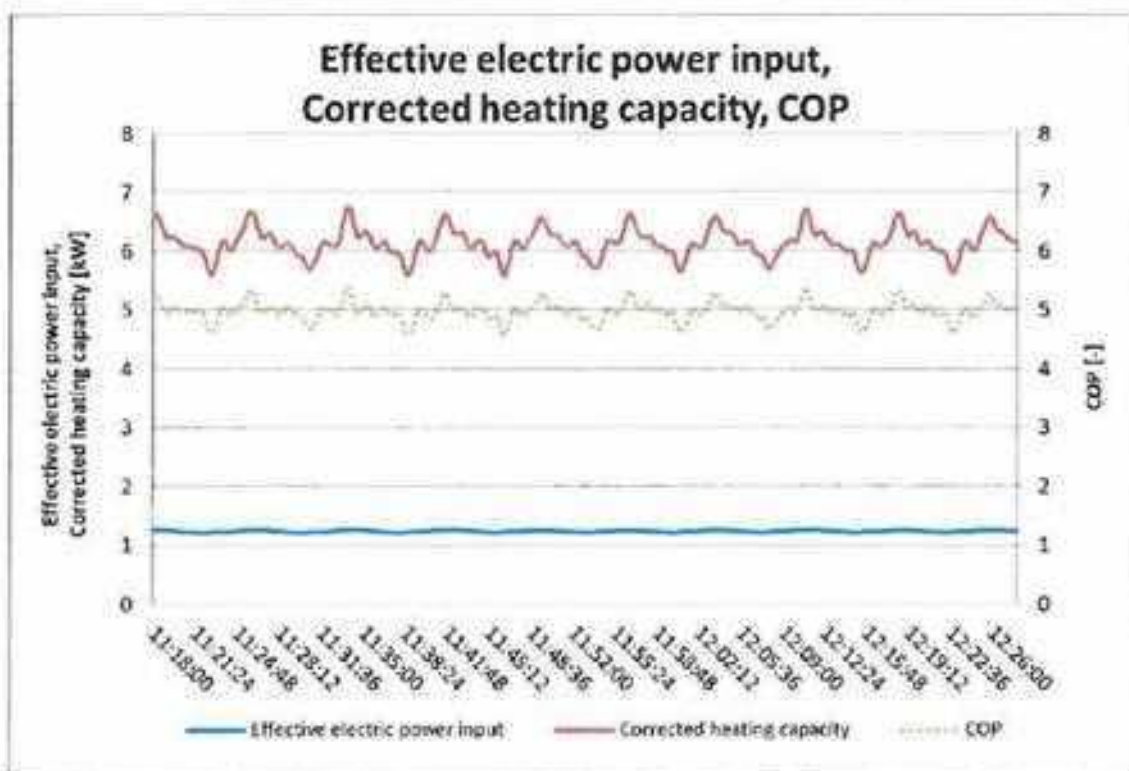
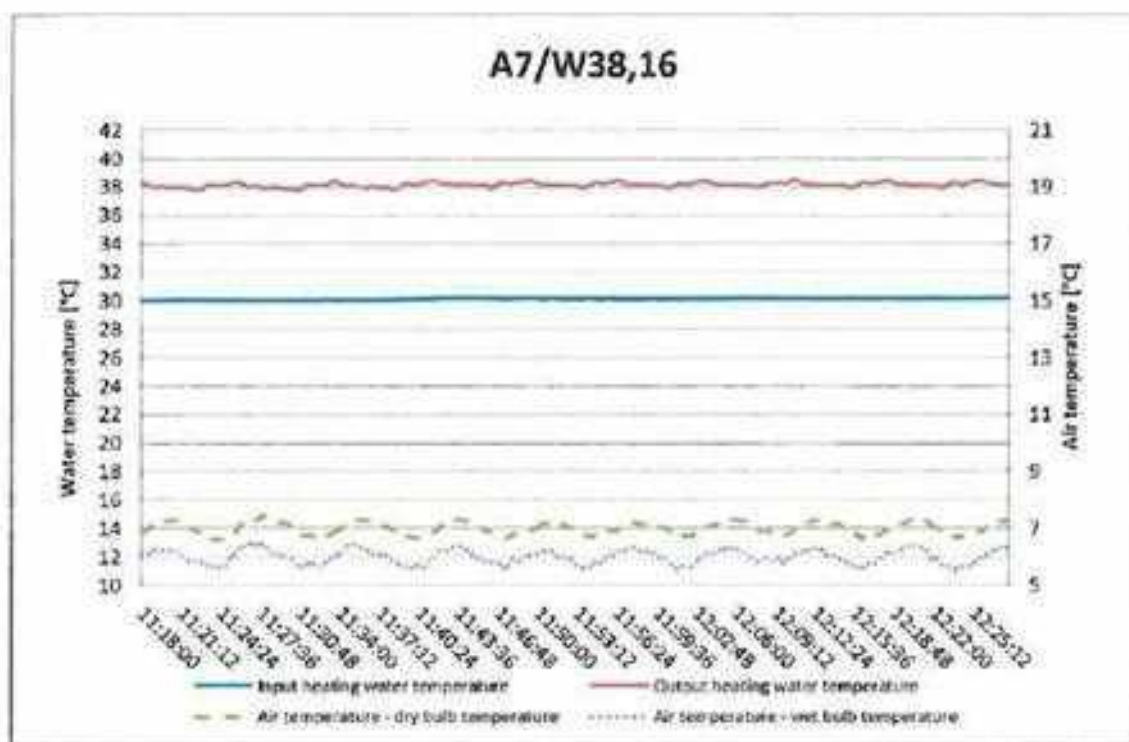
A-7/W52 (95 rps)



A2/W42 (43 rpm)

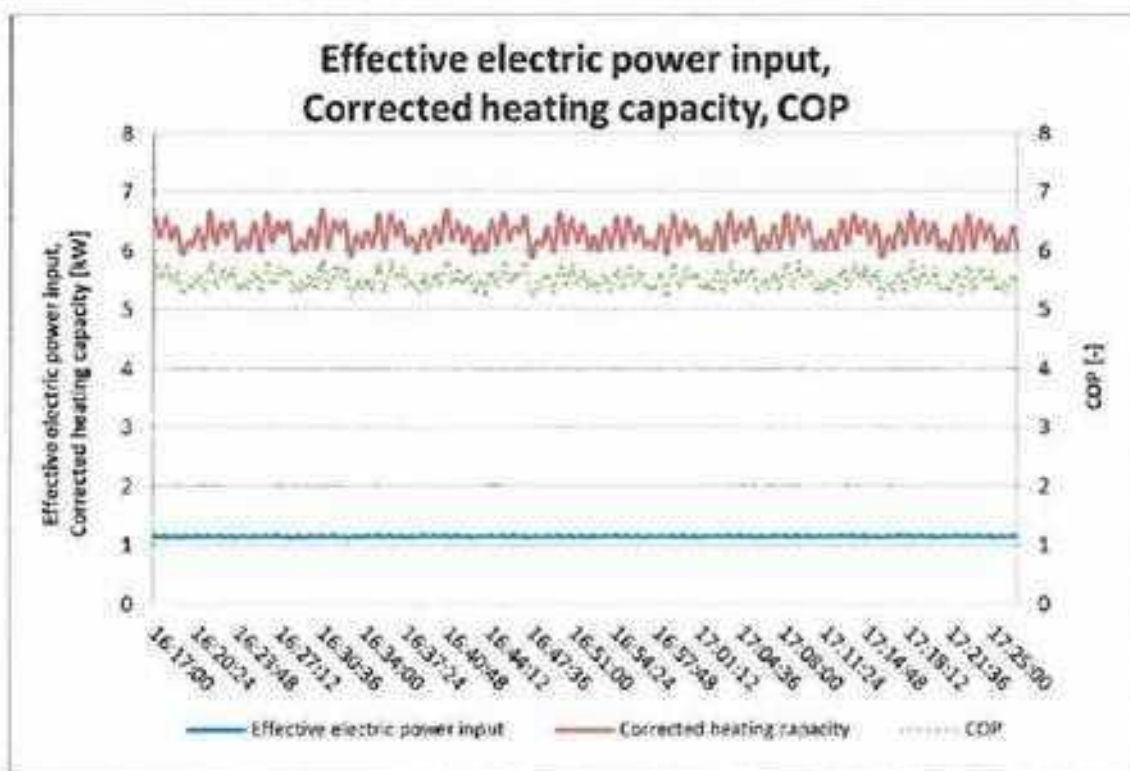
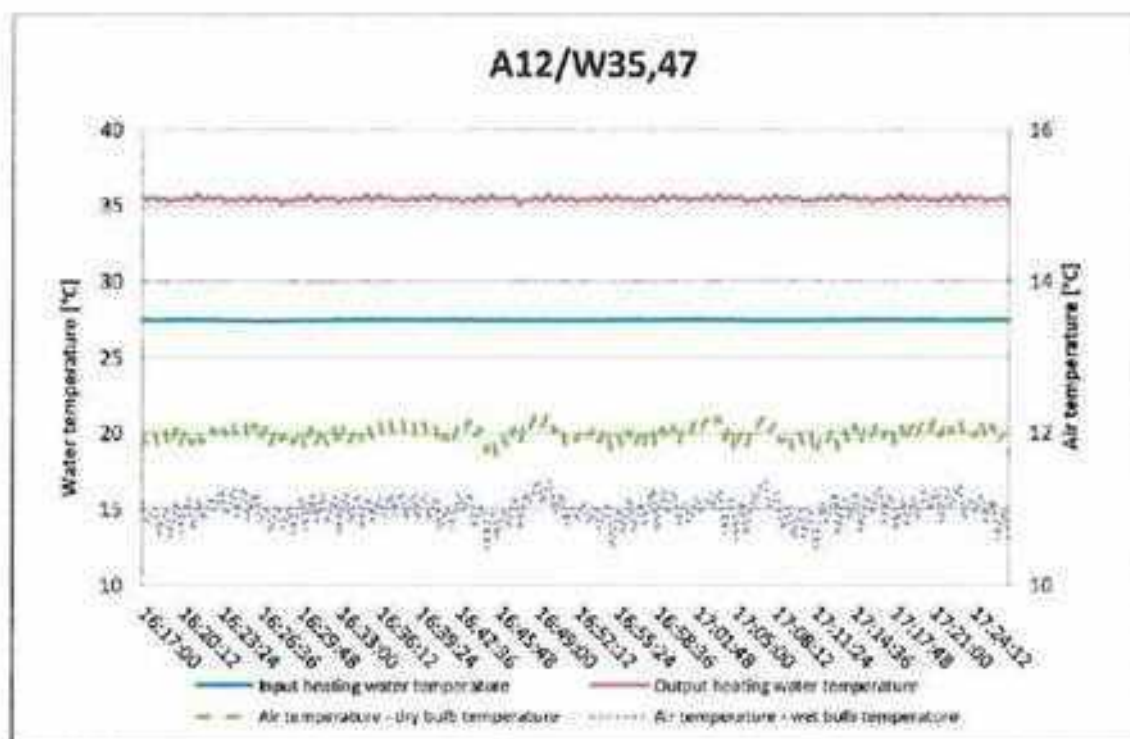


A7/W38.16 (35 rps)

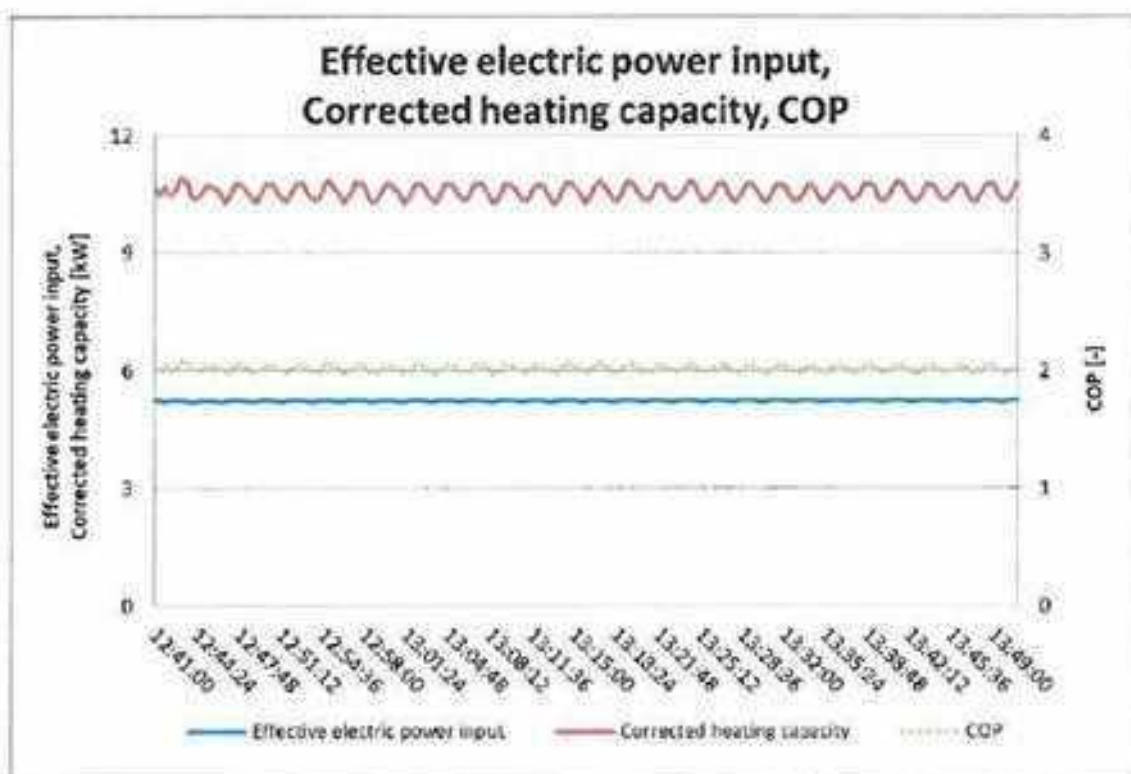
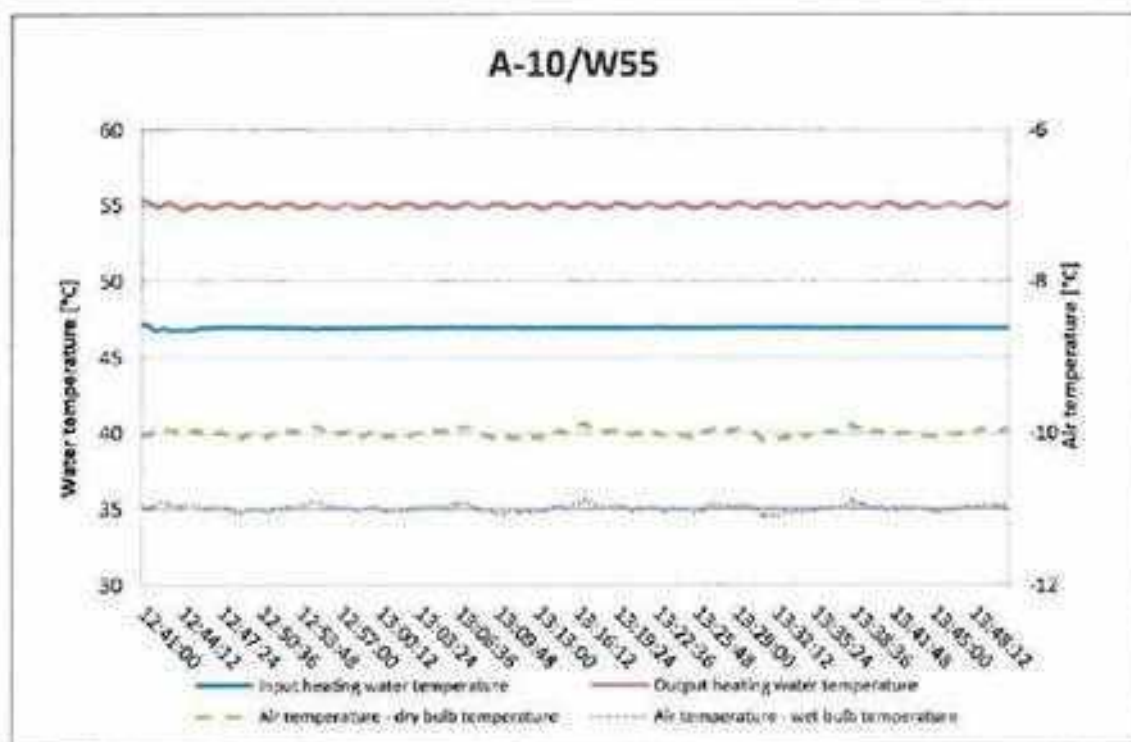




A12/W35,47 (35 rps)




A-10/W55 (95 rps)



**V. A list of referenced documents**

- Order B-80278 of 2023-09-18 (Order reg. no. B-80278, received on 2023-09-23)
- Contract B-80278
- 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
- EHPA Testing regulation – Testing of Air/Water Heat Pumps – Version 2.4a
- Background of the task 39-17312
- Record measurement file 39-17312

Test Report compiled by: Ing. Tomáš Sedláček

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



– End of Test Report –





Testing Laboratory 1045.1 accredited by the Czech Accreditation Institute pursuant to  
ČSN EN ISO/IEC 17025:2018

**Strojírenský zkušební ústav, s.p. Zkušební laboratoř**  
**(Engineering Test Institute, Public Enterprise, Testing Laboratory)**  
Hudcova 424/56b, Medlánky, 621 00 Brno

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## TEST REPORT

### 39-17312/H

**Product:** Outdoor Air/Water Heat Pump – monobloc

**Type designation:** NEXUS M17 PRO

**Customer:** SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz  
POLAND

**Manufacturer:** SUNEX S.A.  
ul. Piaskowa 7  
47-400 Racibórz  
POLAND

**Employee responsible:** Ing. Antonín Kolbábek, Ph.D.

**Report issue date:** 2023-10-25

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

This document may be copied in its entirety without written consent of the Engineering Test Institute. Partial copies are subject to approval. The results of the tests and verifications shall relate only to the products tested as received or presented. The testing laboratory is not responsible for the data provided by the customer specified in the report.

SP-2021-000012\_1\_10

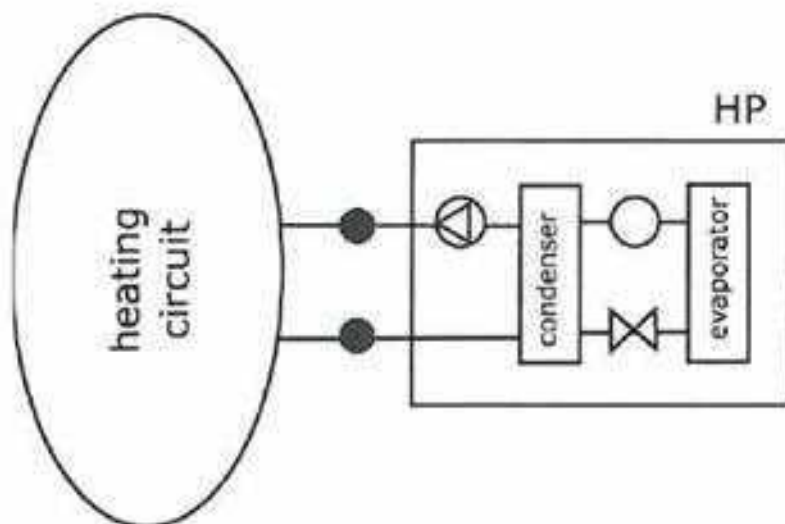
## I. Description of product tested

The Heat pump **NEXUS M17 PRO** supplied by the company **SUNEX S.A.** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor. Refrigerant R290 is used with charge 2.8 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 **NEXUS M17 PRO**:

- Serial number 235078404
- Cubic shape with dimensions 1255 × 670 × 1050 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- Cubic-shaped evaporator, 3 rows, dimensions 825 × 90 × 1005 mm (W × D × H), spacing 3 mm
- Plate condenser, dimensions 160 × 140 × 545 mm (W × D × H) including insulation
- Compressor Siam Compressor Industry APB52FFAMT
- Refrigerant R290 (2.8 kg)
- Electric expansion valve Carol E<sup>2</sup>V
- 4-way reversing valve Sanhua SHF-20D-46-02
- Refrigerant accumulator
- Liquid refrigerant separator
- Axial fan Ø48 cm with motor Ziehl-Abegg FN050-6IQ.BD.V5P4
- Pressure control Alco Controls
- Pressure sensors
- Temperature sensors
- Refrigerant pipes
- Relief valve
- Filter drier Sanhua DTGB 083s
- Check valves Sanhua YCVS10-44GSHC-1
- Circulation pump Grundfos UPM4 K
- Sight glass
- Coil Emerson ESC-EX230VAC

Scheme:



Photodocumentation:



Heat pump NEXUS M17 PRO - outdoor unit  
- Front view -



Heat pump NEXUS M17 PRO - outdoor unit  
- Back view -



Heat pump **NEXUS M17 PRO** - outdoor unit  
- Without cover -

<b>NEXUS CE</b>	
Forma dla pla poulizyja/woda typu mosobole inwerter inwerter mosobolek o silniku heat pump	
<b>Model</b>	<b>NEXUS M17 PRO</b>
Moc grzewcza max (kW)	2,8/21,5 kW
Heating capacity (kW)	
Moc wlotowa w trybie zimowania	0,81/5,35 kW
Max cold power (kW)	
Moc chłodnicza max (kW)	4,1/29,0 kW
Cooling capacity (kW)	
Moc wlotowa w chłodzeniu minimalna	1,7/5,7 kW
Cooling input power min (kW)	
Enerżia	400 W/50 l/h
Power rating	
Zerowowa moc wlotowa	2,52 kW
Rated heat zero	
Zerowowy gradient mocy	16,2 kJ/h
Rated heat rated	
Moc grzewcza nominalna (A17H35)	16,71 kW
Nominal heat output capacity (A17H35)	
Nominate COP (A17H35)	4,21
Nominal COP (A17H35)	
Nominally power input (A17H35)	3,96 kW
Nominal power consumption (A17H35)	
Czynnik atmosferyczny	A120 / 2,8 kg
Refrigerant amount	
GWP czynnika	
Global GWP	171 kg
Rzeczowniki	
Sil wtrysku	
Data file sample	
Date / no.	
Kraj produkcji	Polska
Country of origin	

**SUNEX S.A., ul. Pleszkowa 7, 47-400 Racibórz, Polska**

Heat pump NEXUS M17 PRO - outdoor unit  
- Label -





Heat pump NEXUS M17 PRO - outdoor unit  
– Compressor label –

## II. Sample tested

SZU reg. no.	Product name	Date of submission
0213 23.39007.001	NEXUS M17 PRO	2023-10-16

The visual inspection, tests and verification were carried out by Ing. Antonín Kolbábek Ph.D. at the test station of SZU

The tests were performed using measuring and testing equipment with valid calibration.

## III. Measuring and test equipment:

No.	Description	Inventory number
1.	Electrical energy meter	E1.1
2.	Digital watt meter	1.2.1 ENERGIE ANALYZATOR_1
3.	Flow meter Krohne Optiflux	8.1.1 TECH_K1_V_DN15
4.	Barometer	2.4 MAR18_1_PB
5.	Differential pressure gauge	2.2 MAR18_1_dP
6.	Temperature-humidity meter HF532	2.1.1 K1_VLHKOST_1
7.	Temperature-humidity meter HF532	2.1.3 K1_VLHKOST_2
8.	Thermometers	2.4 MAR18_T

No.	Description	Inventory number
9.	Tape measure	ME 475
10.	Multi-analyser SINUS SoundBook MK2	000-000-000-875/1
11.	Microphone pair G.R.A.S. 40 AK, wind deflector	000-000-000-875/2
12.	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. 7-21	+
2.	Acoustic measurements – Sound power level	Art. 8	ČSN EN 12102-1:2023	Page No. 8-21	+

\* Evaluation / statement of conformity:

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

**Measurement uncertainty:**

Measured quantity	Unit	Uncertainty of measurement	Evaluation
<b>Liquid</b>			
- temperature difference ( $\Delta T$ )	[K]	$\pm 0.15$ K	fulfilled
- temperature inlet/outlet	[°C]	$\pm 0.15$ K	fulfilled
- volume flow	[m³/s]	$\pm 1$ %	fulfilled
- static pressure difference	[kPa]	$\pm 1$ kPa ( $\Delta p \leq 20$ kPa) or $\pm 5$ % ( $\Delta p > 20$ kPa)	fulfilled
<b>Air</b>			
- dry bulb temperature	[°C]	$\pm 0.2$ K	fulfilled
- wet bulb temperature	[°C]	$\pm 0.4$ K	fulfilled
- volume flow	[m³/s]	$\pm 5$ %	not applied
- static pressure difference	[Pa]	$\pm 5$ Pa ( $\Delta p \leq 100$ Pa) or $\pm 5$ % ( $\Delta p > 100$ Pa)	not applied
<b>Refrigerant</b>			
- pressure at compressor outlet	[kPa]	$\pm 1$ %	not applied
- temperature	[°C]	$\pm 0.5$ K	not applied
<b>Concentration (in volume)</b>			
- heat transfer medium	[%]	$\pm 2$	not applied
<b>Electrical quantities</b>			
- electric power	[W]	$\pm 1$ %	fulfilled
- voltage	[V]	$\pm 0.5$ %	fulfilled
- current	[A]	$\pm 0.5$ %	fulfilled
- electric energy	[kWh]	$\pm 1$ %	not applied
Compressor rotational speed	[min⁻¹]	$\pm 0.5$ %	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 at the distance  $d$  [m].

Test sample			For outdoor unit
Distance from the test sample	$d$	[m]	0.20
Height of measurement surface	$h$	[m]	1.29
Width of measurement surface	$w$	[m]	1.66
Depth of measurement surface	$l$	[m]	1.47
Total measurement surface area	$S$	[m <sup>2</sup> ]	10.52
Minimal measuring time per surface	$t_M$	[s]	70.00

Sketch of measurement surface (not to scale)



#### b) Acoustic environment

The testing sample was placed inside climate chamber (with dimensions shown below); sound absorption panels were mounted on walls and ceiling of the chamber. Outdoor unit was placed in the middle of the chamber, at a sufficient distance from the surrounding walls, and was rotated by about  $5 \times 10^\circ$ .

Climate-acoustic chamber (Corresponds to free field over a reflecting plane)			
Chamber width	$l_1$	[m]	3.75
Chamber length	$l_2$	[m]	4.50
Chamber height	$l_3$	[m]	4.25

c) **Measured and calculated data – General overview:**

Test sample			Air/Water Heat Pump NEXUS M17 PRO - 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		
Date of testing			2023-10-24		
Control settings of the fan			AUTO		
Control settings of heat pump / compressor		[Hz]	35	65	95
Reference air temperature	$t_{amb}$	[°C]	6.8	7.0	7.0
Relative humidity of air	$RH$	[%]	88.5	87.5	87.0
Ambient pressure	$p_{amb}$	[hPa]	979.5	980.5	980.5
Overall sound power level (linear)	$L_W$	[dB]	59.6 ± 1.5	77.4 ± 1.5	80.0 ± 1.5
Overall A-weighted sound power level	$L_{WA}$	[dB(A)]	52.2 ± 1.5	64.9 ± 1.5	75.1 ± 1.5
Accuracy class			Engineering (Grade 2)		

<sup>1</sup> Comment to abbreviated marking: i.e. A7/W55  
A (air), 7 (input source air temperature in °C) / W (water), 55 (outlet heating water temperature in °C)



**1A) Measurement results Compressor: 35Hz – octave bands:**

Air/Water Heat pump NEXUS M17 PRO – Outdoor unit at A7/W55 / Compressor: 35Hz; Fan: AUTO /	Engineering (Grade 2)
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$f_m$ [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	$L_w$ [dB]	$L_{WA}$ [dB(A)]	U [dB]	Evaluation
	$L_d$	$F_{pl}$	$L_d > F_{pl}$	$F_{+1k}$	$F_{+1k} \leq 3$	$L_{W(1)} - L_{W(2)} \leq 5$					
125	17.5	5.5	YES	0.0	YES	YES	YES	57.2	39.8	$\pm 3.0$	c
250	20.4	2.3	YES	0.0	YES	YES	YES	53.2	44.4	$\pm 2.0$	passed
500	21.5	3.1	YES	0.0	YES	YES	YES	51.2	48.4	$\pm 1.5$	passed
1000	23.3	3.5	YES	0.0	YES	YES	YES	45.2	45.1	$\pm 1.5$	passed
2000	21.0	3.8	YES	0.0	YES	YES	YES	41.8	42.9	$\pm 1.5$	passed
4000	20.8	4.5	YES	0.5	YES	YES	YES	37.2	38.1	$\pm 1.5$	c
6000 <sup>*)</sup>	20.1	9.0	YES	2.4	YES	YES	YES	34.4	34.3	$\pm 2.5$	c
<b>Total</b>								<b>59.6</b>	<b>52.2</b>	<b><math>\pm 1.5</math></b>	

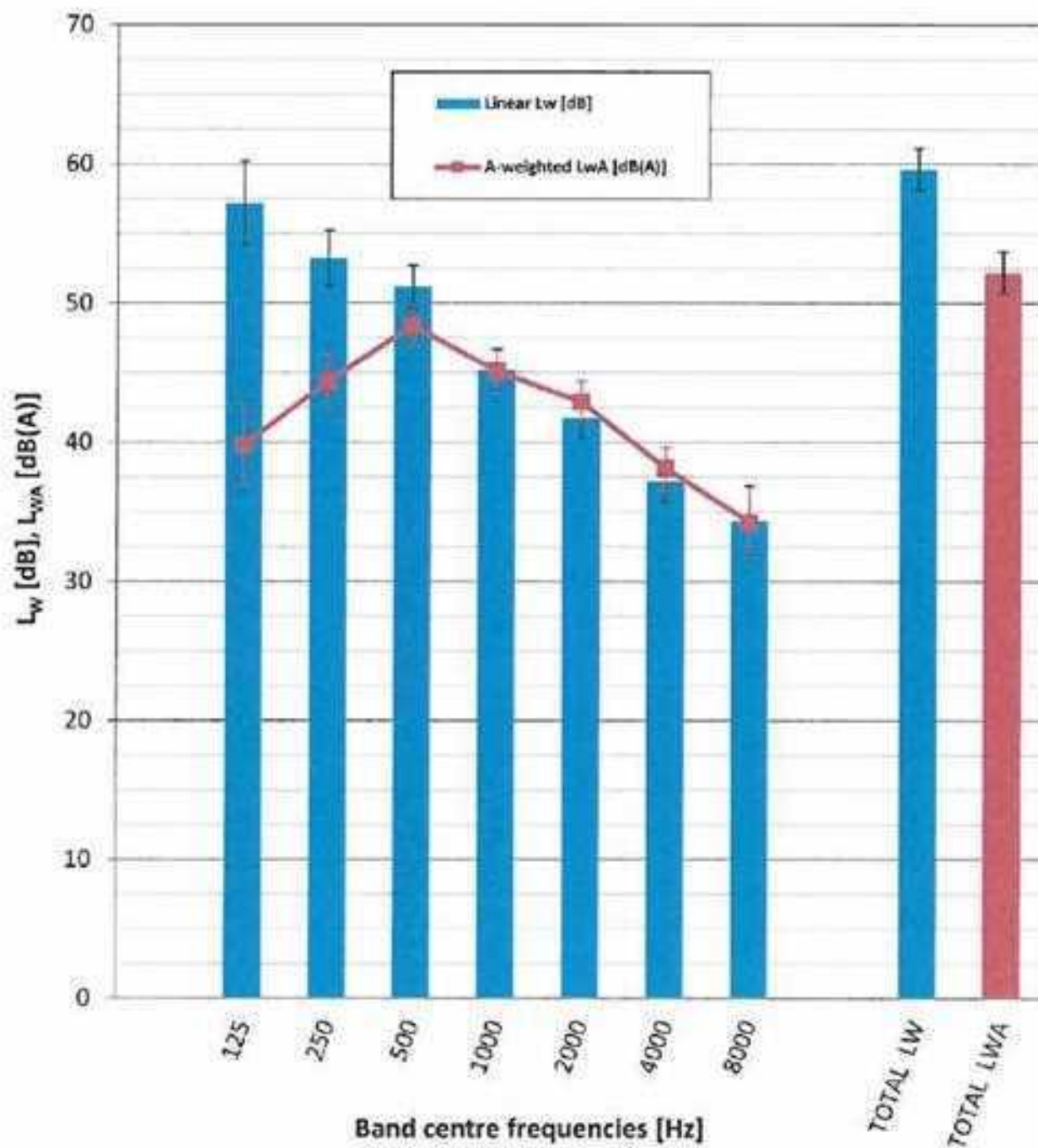
<sup>\*)</sup> Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.

**Legend:**

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

**Spectrum of Sound power level  $L_W$  – octave bands**

Air/Water Heat pump <b>NEXUS M17 PRO</b> – Outdoor unit at A7/W55 / Compressor: 35Hz; Fan: AUTO /	Engineering (Grade 2)
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**1B) Measurement results Compressor: 35Hz – one-third octave bands**

Air/Water Heat pump NEXUS M17 PRO – Outdoor unit at A7/W55 / Compressor: 35Hz; Fan: AUTO /	Engineering (Grade 2)
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$f_m$ [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	$L_w$ [dB]	$L_{wA}$ [dB(A)]	U [dB]	Evaluation
	$L_d$	$F_d$	$L_d > F_d$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{w(1)} - L_{w(2)} \leq 5$					
100	16.3	3.0	YES	0.0	YES	YES	YES	55.9	36.8	$\pm 3.0$	passed
125	17.5	5.5	YES	0.0	YES	YES	YES	48.1	32.0	$\pm 3.0$	c
160	18.7	4.7	YES	0.0	YES	YES	YES	48.4	35.0	$\pm 3.0$	c
200	19.7	3.6	YES	0.0	YES	YES	YES	48.8	37.9	$\pm 2.0$	passed
250	20.4	2.3	YES	0.0	YES	YES	YES	49.9	41.3	$\pm 2.0$	passed
315	21.0	3.4	YES	0.0	YES	YES	YES	45.6	39.0	$\pm 2.0$	passed
400	21.4	2.9	YES	0.0	YES	YES	YES	43.3	38.5	$\pm 1.5$	passed
500	21.5	3.1	YES	0.0	YES	YES	YES	47.4	44.2	$\pm 1.5$	passed
630	21.9	3.0	YES	0.0	YES	YES	YES	47.4	45.5	$\pm 1.5$	passed
800	23.8	3.6	YES	0.0	YES	YES	YES	41.4	40.6	$\pm 1.5$	passed
1000	23.3	3.5	YES	0.0	YES	YES	YES	40.6	40.6	$\pm 1.5$	passed
1250	23.4	3.8	YES	0.0	YES	YES	YES	39.2	39.8	$\pm 1.5$	passed
1600	22.1	3.6	YES	0.0	YES	YES	YES	38.5	39.5	$\pm 1.5$	passed
2000	21.0	3.8	YES	0.0	YES	YES	YES	36.8	38.0	$\pm 1.5$	passed
2500	21.3	4.4	YES	0.0	YES	YES	YES	34.9	36.2	$\pm 1.5$	passed
3150	21.0	7.0	YES	1.2	YES	YES	YES	31.7	32.9	$\pm 1.5$	c
4000	20.8	4.6	YES	0.5	YES	YES	YES	33.4	34.4	$\pm 1.5$	c
5000	20.3	4.0	YES	0.1	YES	YES	YES	31.9	32.4	$\pm 1.5$	c
6300	20.1	9.0	YES	2.4	YES	YES	YES	29.6	29.5	$\pm 2.5$	c
Total								59.6	52.2	$\pm 1.5$	

**Legend:**

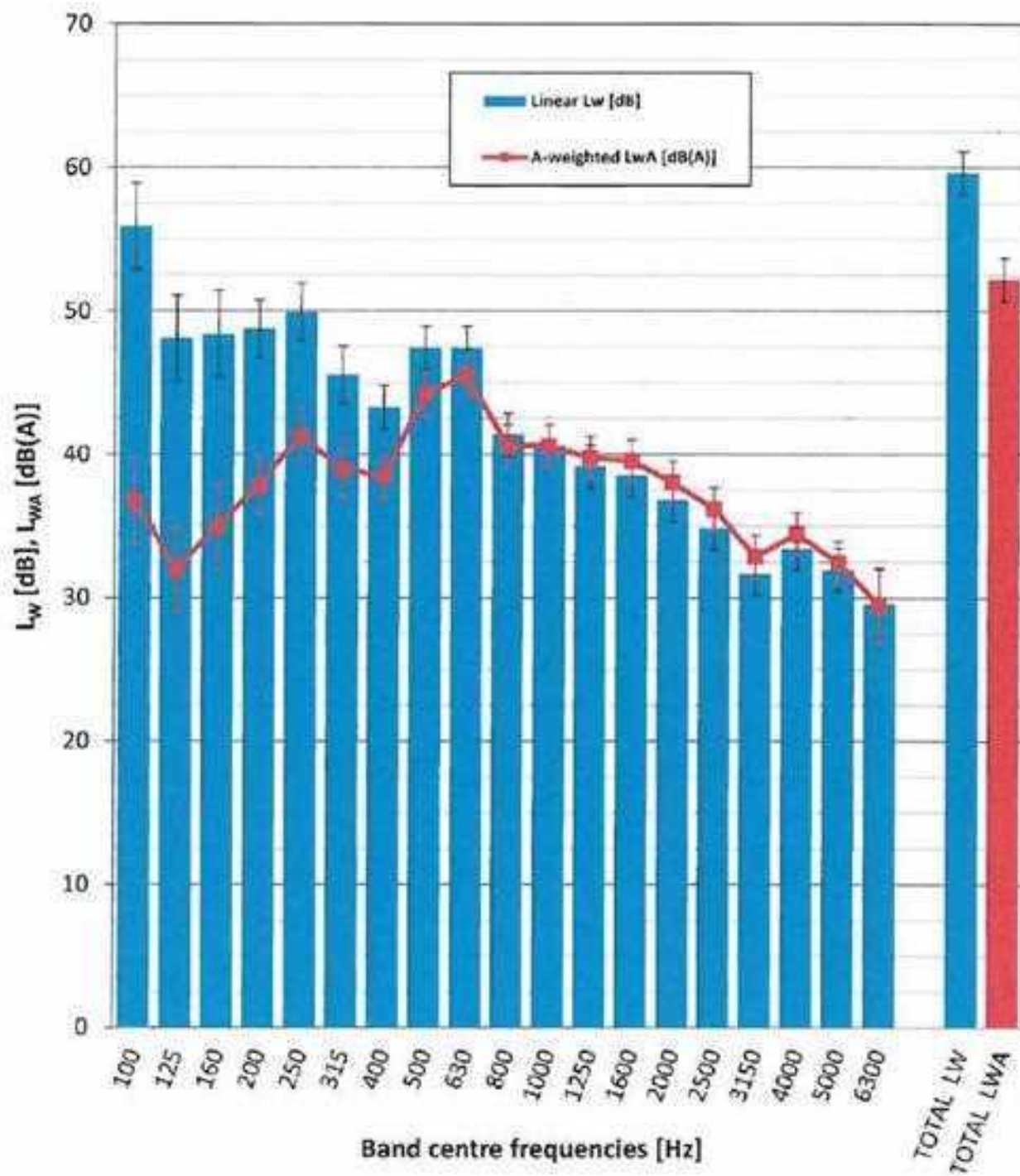
- passed* Third frequency bands with this description are significant for calculation of A-weighted total sound power level  $L_{wA}$ . Required accuracy class is fulfilled in this band.
- not passed* Third frequency bands with this description are significant for calculation of A-weighted total sound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



**Spectrum of Sound power level  $L_w$  – third-octave bands**

Air/Water Heat pump **NEXUS M17 PRO** – Outdoor unit at A7/W55  
/ Compressor: 35Hz; Fan: AUTO /

**Engineering  
(Grade 2)**



**2A) Measurement results Compressor: 65Hz – octave bands.**

Air/Water Heat pump <b>NEXUS M17 PRO</b> – Outdoor unit at A7/W55 / Compressor: 65Hz; Fan: AUTO /										Engineering (Grade 2)	
$f_m$ [Hz]	Criterion 1 $L_d$ $F_{pl}$ $L_d > F_{pl}$			Criterion 2 $F_{40}$ $F_{40} \leq 3$		Criterion 3 $L_{w(1)} - L_{w(2)} \leq 5$	All criteria passed?	$L_w$ [dB]	$L_{WA}$ [dB(A)]	$U$ [dB]	Evaluation
125	17.5	3.2	YES	0.0	YES	YES	YES	66.7	50.6	$\pm 3.0$	c
250	20.4	3.0	YES	0.0	YES	YES	YES	70.5	61.5	$\pm 2.0$	passed
500	21.5	3.0	YES	0.0	YES	YES	YES	59.8	56.7	$\pm 1.5$	passed
1000	23.3	3.4	YES	0.0	YES	YES	YES	57.9	57.7	$\pm 1.5$	passed
2000	21.0	3.0	YES	0.0	YES	YES	YES	53.1	54.2	$\pm 1.5$	c
4000	20.8	3.2	YES	0.0	YES	YES	YES	47.7	46.7	$\pm 1.5$	c
8000 <sup>*)</sup>	20.1	4.9	YES	0.0	YES	NO	NO	45.1	45.0	$\pm 2.5$	nc
<b>Total</b>								<b>72.5</b>	<b>64.7</b>	<b><math>\pm 1.5</math></b>	

<sup>\*)</sup> Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.

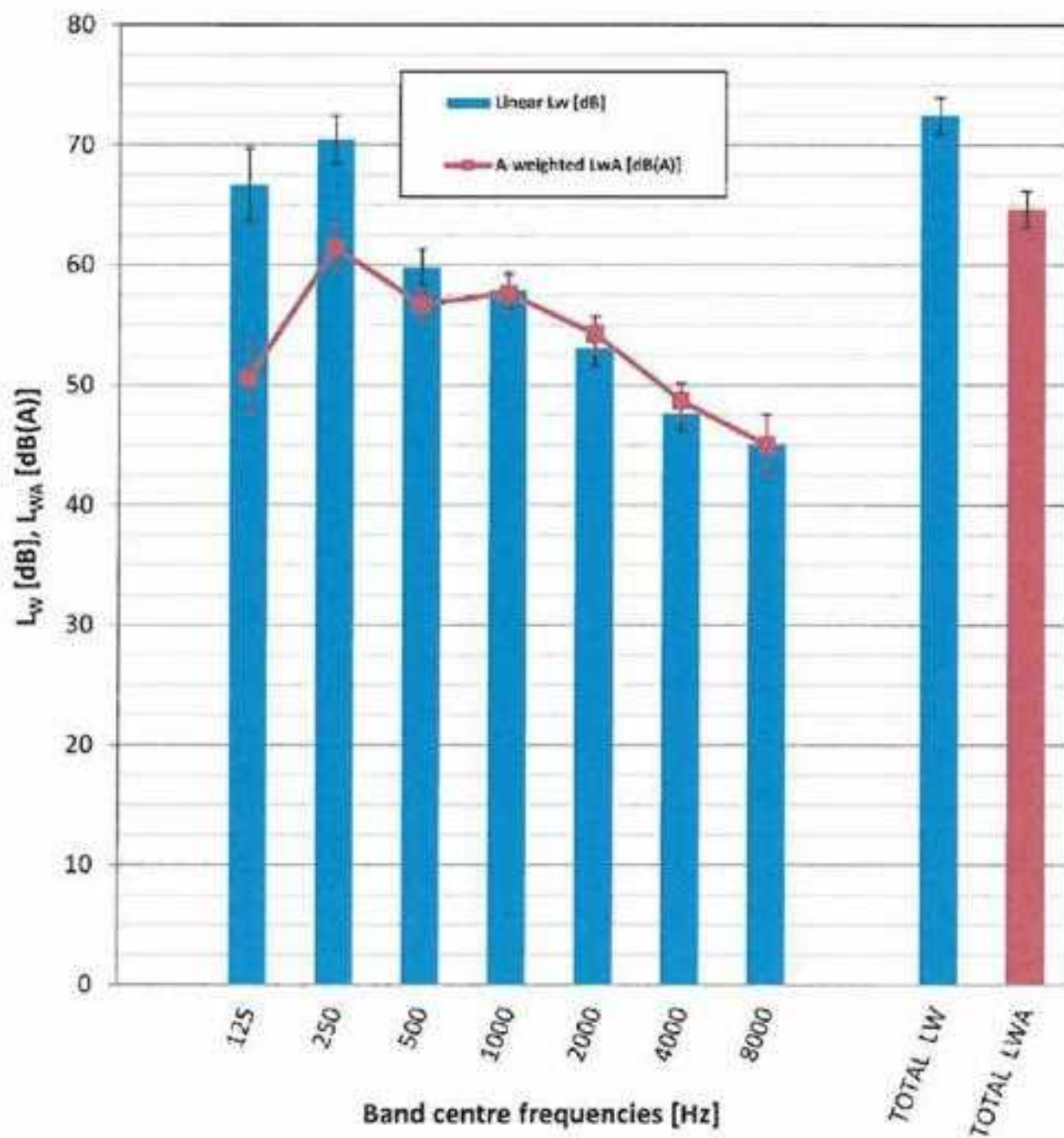
**Legend:**

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

**Spectrum of Sound power level  $L_w$  – octave bands**

Air/Water Heat pump **NEXUS M17 PRO** – Outdoor unit at A7/W55  
/ Compressor: 65Hz; Fan: AUTO /

**Engineering  
(Grade 2)**





**2B) Measurement results Compressor: 65Hz – one-third octave bands**

Air/Water Heat pump <b>NEXUS M17 PRO</b> – Outdoor unit at A7/W55 / Compressor: 65Hz; Fan: AUTO /	<b>Engineering (Grade 2)</b>
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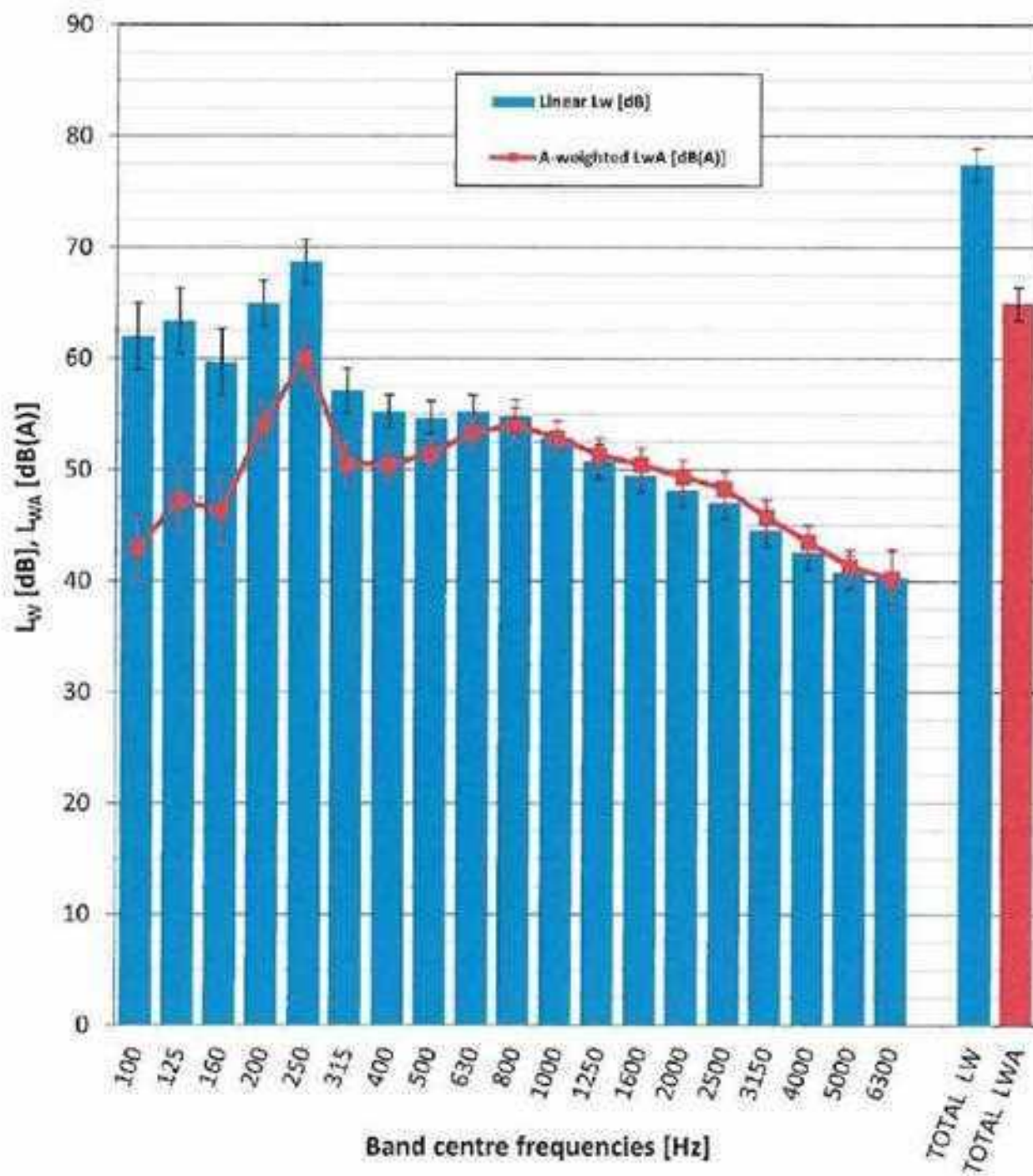
$f_m$	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	Lw	Lwa	U	Evaluation
[Hz]	$L_d$	$F_{pl}$	$L_d > F_{pl}$	$F_{id}$	$F_{id} \leq 3$	$L_{w(p)} - L_{w(p)} \leq 5$		[dB]	[dB(A)]	[dB]	
100	16.3	1.1	YES	0.0	YES	YES	YES	62.0	42.9	$\pm 3.0$	c
125	17.5	3.2	YES	0.0	YES	YES	YES	63.4	47.3	$\pm 3.0$	c
160	18.7	2.8	YES	0.0	YES	YES	YES	59.7	46.3	$\pm 3.0$	c
200	19.7	2.9	YES	0.0	YES	YES	YES	65.0	54.1	$\pm 2.0$	passed
250	20.4	3.0	YES	0.0	YES	YES	YES	68.7	60.1	$\pm 2.0$	passed
315	21.0	3.2	YES	0.0	YES	YES	YES	57.1	50.5	$\pm 2.0$	passed
400	21.4	3.2	YES	0.0	YES	YES	YES	55.2	50.4	$\pm 1.5$	passed
500	21.5	3.0	YES	0.0	YES	YES	YES	54.7	51.5	$\pm 1.5$	passed
630	21.9	3.3	YES	0.0	YES	YES	YES	55.3	53.4	$\pm 1.5$	passed
800	23.8	3.4	YES	0.0	YES	YES	YES	54.8	54.0	$\pm 1.5$	passed
1000	23.3	3.4	YES	0.0	YES	YES	YES	52.9	52.9	$\pm 1.5$	passed
1250	23.4	3.3	YES	0.0	YES	YES	YES	50.8	51.4	$\pm 1.5$	passed
1600	22.1	3.2	YES	0.0	YES	YES	YES	49.5	50.5	$\pm 1.5$	passed
2000	21.0	3.0	YES	0.0	YES	YES	YES	48.2	49.4	$\pm 1.5$	c
2500	21.3	2.7	YES	0.0	YES	YES	YES	47.0	48.3	$\pm 1.5$	c
3150	21.0	3.0	YES	0.0	YES	YES	YES	44.6	45.8	$\pm 1.5$	c
4000	20.8	3.2	YES	0.0	YES	YES	YES	42.5	43.5	$\pm 1.5$	c
5000	20.3	3.5	YES	0.0	YES	YES	YES	40.8	41.3	$\pm 1.5$	c
6300	20.1	4.9	YES	0.0	YES	NO	NO	40.3	40.2	$\pm 2.5$	nc
<b>Total</b>								<b>77.4</b>	<b>64.9</b>	<b><math>\pm 1.5</math></b>	

**Legend:**

- passed* Third frequency bands with this description are significant for calculation of A-weighted total sound power level  $L_{wa}$ . Required accuracy class is fulfilled in this band.
- not passed* Third frequency bands with this description are significant for calculation of A-weighted total sound power level  $L_{wa}$ . Required accuracy class is not fulfilled in this band.
- c* Third frequency bands with this description are not significant for calculating of A-weighted total sound power level  $L_{wa}$ . These bands are evaluated in calculating of  $L_{wa}$ .
- nc* Third frequency bands with this description are not significant for calculating of A-weighted total sound power level  $L_{wa}$ . This bands are not evaluated in calculating of  $L_{wa}$ .

Air/Water Heat pump NEXUS M17 PRO – Outdoor unit at A7/W55  
/ Compressor: 65Hz; Fan: AUTO /

Engineering  
(Grade 2)



**3A) Measurement results Compressor: 95Hz – octave bands**

Air/Water Heat pump NEXUS M17 PRO – Outdoor unit at A7/W55 / Compressor: 95Hz; Fan: AUTO /	Engineering (Grade 2)
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$f_m$ [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	$L_w$ [dB]	$L_{WA}$ [dB(A)]	U [dB]	Evaluation
	$L_d$	$F_{pl}$	$L_1 > F_{pl}$	$F_{ul}$	$F_{ul} \leq 3$	$L_{w(1)} - L_{w(2)} \leq 3$					
125	17.5	3.5	YES	0.0	YES	YES	YES	85.3	66.6	$\pm 3.0$	c
250	20.4	2.9	YES	0.0	YES	YES	YES	78.7	69.0	$\pm 2.0$	passed
500	21.5	3.2	YES	0.0	YES	YES	YES	71.1	68.0	$\pm 1.5$	passed
1000	23.3	3.7	YES	0.0	YES	YES	YES	68.9	68.8	$\pm 1.5$	passed
2000	21.0	3.4	YES	0.0	YES	YES	YES	63.9	65.0	$\pm 1.5$	passed
4000	20.8	3.1	YES	0.0	YES	YES	YES	58.1	59.1	$\pm 1.5$	c
8000 <sup>*)</sup>	20.1	4.8	YES	0.0	YES	NO	NO	51.4	51.3	$\pm 2.5$	nc
<b>Total</b>								<b>86.4</b>	<b>74.8</b>	<b><math>\pm 1.5</math></b>	

<sup>\*)</sup> Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.

**Legend:**

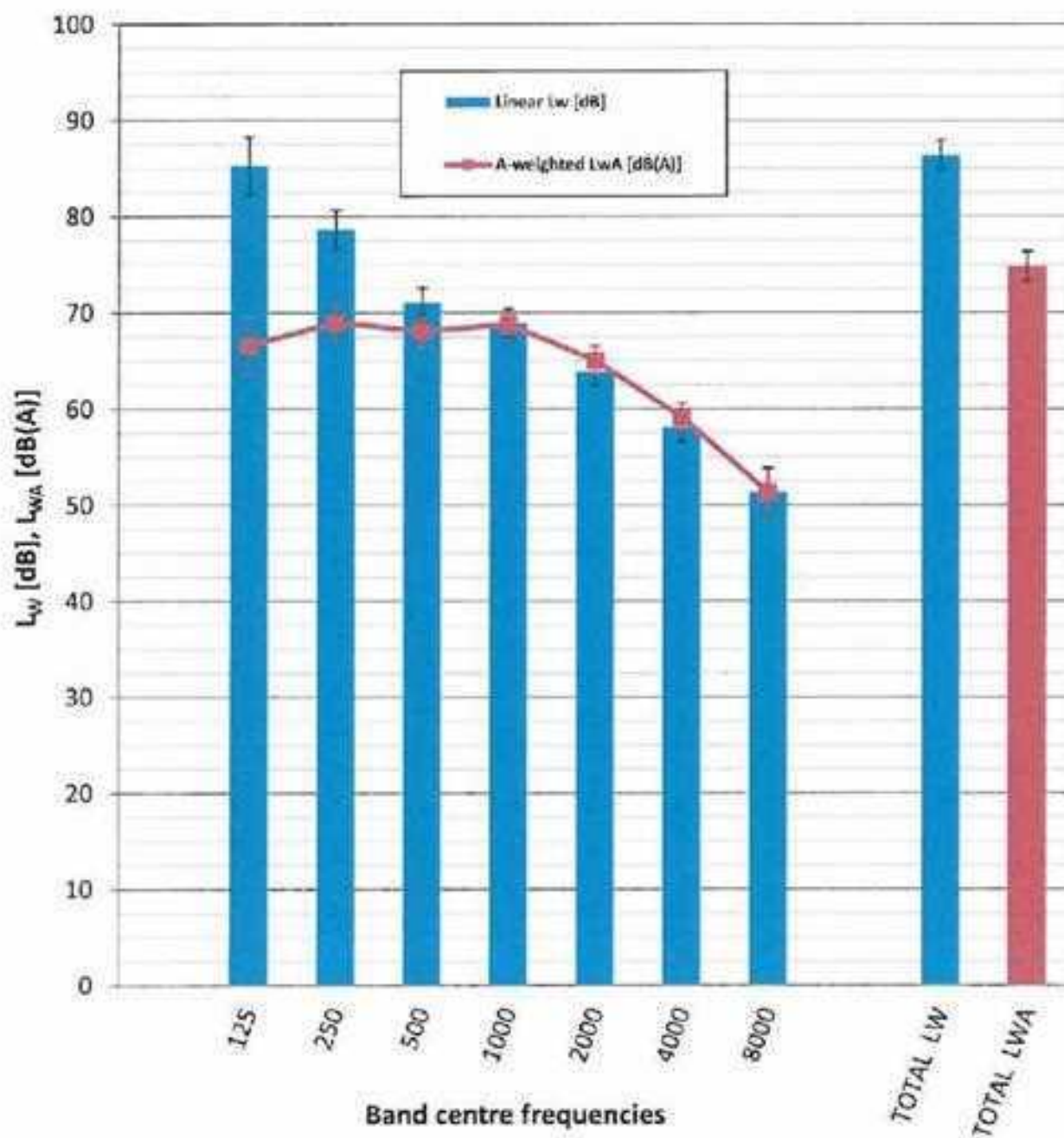
- passed** Third frequency bands with this description are significant for calculation of A-weighted total sound power level  $L_{WA}$ . Required accuracy class is fulfilled in this band.
- not passed** Third frequency bands with this description are significant for calculation of A-weighted total sound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



**Spectrum of Sound power level  $L_W$  – octave bands**

Air/Water Heat pump **NEXUS M17 PRO** – Outdoor unit at A7/W55  
/ Compressor: 95Hz; Fan: AUTO /

**Engineering  
(Grade 2)**



**Note:** Significant bands (i.e., resonant peaks) are highlighted with a red border

**3B) Measurement results – one-third octave bands**

Air/Water Heat pump <b>NEXUS M17 PRO</b> – Outdoor unit at A7/W55 / Compressor: 95Hz; Fan: AUTO /	<b>Engineering (Grade 2)</b>
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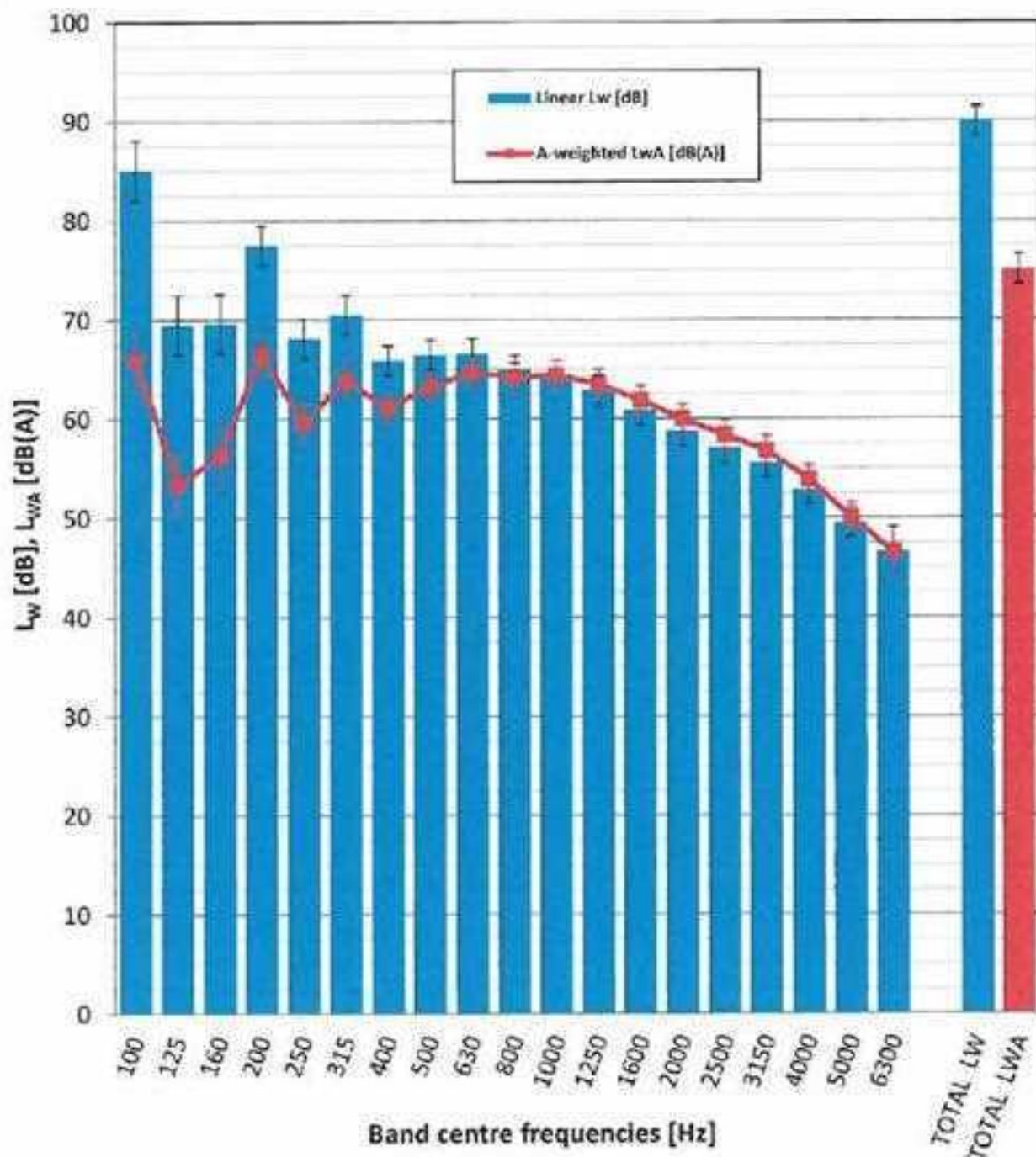
$f_m$ [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	$L_w$ [dB]	$L_{wA}$ [dB(A)]	U [dB]	Evaluation
	$L_d$	$F_{pl}$	$L_f > F_{pl}$	$F_{+1}$	$F_{+1} \leq 3$	$L_{w(1)} - L_{w(2)} \leq 5$					
100	16.3	3.3	YES	0.0	YES	YES	YES	85.1	66.0	$\pm 3.0$	passed
125	17.5	3.5	YES	0.0	YES	YES	YES	89.5	53.4	$\pm 3.0$	c
160	18.7	3.0	YES	0.0	YES	YES	YES	69.6	56.2	$\pm 3.0$	c
200	19.7	2.7	YES	0.0	YES	YES	YES	77.5	66.6	$\pm 2.0$	passed
250	20.4	2.9	YES	0.0	YES	YES	YES	68.1	59.5	$\pm 2.0$	passed
315	21.0	2.2	YES	0.0	YES	YES	YES	70.5	63.9	$\pm 2.0$	passed
400	21.4	3.3	YES	0.0	YES	YES	YES	65.9	61.1	$\pm 1.5$	passed
500	21.5	3.2	YES	0.0	YES	YES	YES	66.5	63.3	$\pm 1.5$	passed
630	21.9	3.4	YES	0.0	YES	YES	YES	66.6	64.7	$\pm 1.5$	passed
800	23.8	3.6	YES	0.0	YES	YES	YES	64.9	64.1	$\pm 1.5$	passed
1000	23.3	3.7	YES	0.0	YES	YES	YES	64.4	64.4	$\pm 1.5$	passed
1250	23.4	3.7	YES	0.0	YES	YES	YES	62.9	63.5	$\pm 1.5$	passed
1600	22.1	3.6	YES	0.0	YES	YES	YES	60.9	61.9	$\pm 1.5$	passed
2000	21.0	3.4	YES	0.0	YES	YES	YES	58.7	59.9	$\pm 1.5$	passed
2500	21.3	3.0	YES	0.0	YES	YES	YES	57.0	58.3	$\pm 1.5$	passed
3150	21.0	2.6	YES	0.0	YES	YES	YES	55.6	56.8	$\pm 1.5$	passed
4000	20.8	3.1	YES	0.0	YES	YES	YES	52.9	53.9	$\pm 1.5$	c
5000	20.3	3.9	YES	0.0	YES	NO	NO	49.5	50.0	$\pm 1.5$	nc
6300	20.1	4.6	YES	0.0	YES	NO	NO	46.6	46.5	$\pm 2.5$	nc
<b>Total</b>								<b>90.0</b>	<b>75.1</b>	<b><math>\pm 1.5</math></b>	

**Legend:**

- passed** Third frequency bands with this description are significant for calculation of A-weighted total sound power level  $L_{wA}$ . Required accuracy class is fulfilled in this band.
- not passed** Third frequency bands with this description are significant for calculation of A-weighted total sound power level  $L_{wA}$ . Required accuracy class is not fulfilled in this band.
- c** Third frequency bands with this description are not significant for calculating of A-weighted total sound power level  $L_{wA}$ . These bands are evaluated in calculating of  $L_{wp}$ .
- nc** Third frequency bands with this description are not significant for calculating of A-weighted total sound power level  $L_{wA}$ . These bands are not evaluated in calculating of  $L_{wA}$ .

Air/Water Heat pump NEXUS M17 PRO – Outdoor unit at A7/W55  
/ Compressor: 95Hz; Fan: AUTO /

Engineering  
(Grade 2)



Tested by: Ing. Antonín Kolbábek, Ph.D.

Date: 2023-10-25

Signed:

Reviewed and approved by: Ing. Petr Lindovský

Date: 2023-10-25

Signed:



**V. A list of referenced documents**

- Order of 2023-09-18 (Order reg. no. B-80278, received on 2023-09-19)
- Contract B-80278/39
- ČSN EN 12102-1:2023 - Air conditioners, liquid chilling packages, heat pumps, process chillers and dehumidifiers with electrically driven compressors - Determination of the sound power level - Part 1: Air conditioners, liquid chilling packages, heat pumps for space heating and cooling, dehumidifiers and process chillers
- ČSN ISO 9614-2:1997 - Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning
- EHPA Testing regulation – Testing of Air/Water Heat Pumps – Additional requirements for granting the international quality label for heat pumps – Version 2.4a
- 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 SZU task no. 39-17312
- Measurement record file Sunex\_Nexus16(39-17312).zip

Test Report compiled by: **Ing. Ondřej Bilkovič**Test Report approved by: **Ing. Antonín Kolbábek, Ph.D.**  
Head of Mechanical Equipment Test Station

– End of Test Report –