TEST REPORT

Report no.:
300-KLAB-24-037

DANISH TECHNOLOGICAL INSTITUTE

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Customer:	Company:	NETSU S.A
	Address:	ul. Żeliwna 38 lok. 0.10
	City:	40-599 Katowice, Poland
	Tel.:	+48 323070055
Component:	Brand:	NETSU
	Type:	Air to water heat pump (mono block)
	Model:	Outdoor unit: AM-NET-9-1PH
		Indoor unit: AM-NET-IDU-1PH
	Series no.:	Outdoor unit: AN0433-OD1114
		Indoor unit: AN0433-ID-1064
	Prod. Year:	Outdoor unit: N/A
		Indoor unit: N/A

Dates: Component tested: September – October 2024

Procedure: See objective (page 2) for list of standards.

Remarks: The unit was delivered by the customer. The installation and test settings were done according to the manufacturer's instructions. The water outlet temperature inside the indoor unit was pulled out of its pocket, in order to perform the A-10W55 test. For Sound test some settings like superheat, discharge temp and EEV opening was changed, because the unit couldn't reach 55 °C water flow temperature with factory settings.

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Division/Centre: Danish Technological Institute
Energy and Climate
Heat Pump Laboratory, Aarhus

Date: 2024.10.18

Signature:
Rasmus Thisgaard
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Co-reader:
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DIGITALLY SIGNED DOCUMENT
18 October 2024
DANISH TECHNOLOGICAL INSTITUTE

DANAK
Test Reg. nr. 300

Objective

The objective of this report is to document the following:

The Seasonal Coefficient of Performance (SCOP) at low and medium temperature application for average climate according to EN 14825:2022.

In order to calculate the SCOP, tests were carried out at the part load conditions stated in the tables on page 4 and 5.

COP test standard rating conditions A7/W35 and A7/W55 according to EN 14511:2022.

Sound power measurements according to EN 12102-1:2022.

Contents:

Test conditions

SCOP test conditions for low temperature – EN 14825

Part load conditions for reference SCOP and reference SCOPon calculation of air to water units for low temperature application for the reference heating season;
"A" = average, "W" = warmer, and "C" = colder.

	Part load ratio in %				Outdoor heat exchanger		Indoor heat exchanger			
					Dry (wet) bulb temperature °C		Fixed outlet °C	Variable outlet[d] °C		
	Formula	Average	Warmer	Colder	Outdoor air	Exhaust air	All climates	Average	Warmer	Colder
A	$(-7 - 16) / (T_{designh} - 16)$	88,46	n.a.	60,53	−7(−8)	20(12)	[a] / 35	[a] / 34	n.a.	[a] / 30
B	$(+2 - 16) / (T_{designh} - 16)$	53,85	100,00	36,84	2(1)	20(12)	[a] / 35	[a] / 30	[a] / 35	[a] / 27
C	$(+7 - 16) / (T_{designh} - 16)$	34,62	64,29	23,68	7(6)	20(12)	[a] / 35	[a] / 27	[a] / 31	[a] / 25
D	$(+12 - 16) / (T_{designh} - 16)$	15,38	28,57	10,53	12(11)	20(12)	[a] / 35	[a] / 24	[a] / 26	[a] / 24
E	$(TOL^{e} - 16) / (T_{designh} - 16)$				TOL^{e}	20(12)	[a] / 35	[a] / [b]	[a] / [b]	[a] / [b]
F	$(T_{biv} - 16) / (T_{designh} - 16)$				T_{biv}	20(12)	[a] / 35	[a] / [c]	[a] / [c]	[a] / [c]
G	$(-15 - 16) / (T_{designh} - 16)$	n.a.	n.a.	81,58	−15	20(12)	[a] / 35	n.a.	n.a.	[a] / 32

Additional information

Climate	$T_{designh}$ [°C]	$T_{bivalent}$ [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-7	-10	Variable	Fixed

SCOP test conditions for medium temperature – EN 14825

Part load conditions for reference SCOP and reference SCOPon calculation of air to water units for medium temperature application for the reference heating season;
"A" = average, "W" = warmer, and "C" = colder.

	Part load ratio in %				Outdoor heat exchanger		Indoor heat exchanger			
					Dry (wet) bulb temperature °C		Fixed outlet °C	Variable outlet[d] °C		
	Formula	Average	Warmer	Colder	Outdoor air	Exhaust air	All climates	Average	Warmer	Colder
A	$(-7 - 16) / (T_{designh} - 16)$	88,46	n.a.	60,53	-7(-8)	20(12)	[a] / 55	[a] / 52	n.a.	[a] / 44
B	$(+2 - 16) / (T_{designh} - 16)$	53,85	100	36,84	2(1)	20(12)	[a] / 55	[a] / 42	[a] / 55	[a] / 37
C	$(+7 - 16) / (T_{designh} - 16)$	34,62	64,29	23,68	7(6)	20(12)	[a] / 55	[a] / 36	[a] / 46	[a] / 32
D	$(+12 - 16) / (T_{designh} - 16)$	15,38	28,57	10,53	12(11)	20(12)	[a] / 55	[a] / 30	[a] / 34	[a] / 28
E	$(TOL^{e} - 16) / (T_{designh} - 16)$				TOL^{e}	20(12)	[a] / 55	[a] / [b]	[a] / [b]	[a] / [b]
F	$(T_{biv} - 16) / (T_{designh} - 16)$				T_{biv}	20(12)	[a] / 55	[a] / [c]	[a] / [c]	[a] / [c]
G	$(-15 - 16) / (T_{designh} - 16)$	n.a.	n.a.	81,58	-15	20(12)	[a] / 55	n.a.	n.a.	[a] / 49

Additional information

Climate	$T_{designh}$ [°C]	$T_{bivalent}$ [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-7	-10	Variable	Fixed

COP test conditions - low temperature – EN 14511

N#	Heat source		Heat sink	
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)
1S	7	6	30	35

S: Standard rating condition

COP test conditions - medium temperature – EN 14511

N#	Heat source		Heat sink	
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)
1S	7	6	47	55

S: Standard rating condition

Test conditions for sound power measurements – EN 12102-1

N#	Test condition		Heat pump settings			
	Outdoor heat exchanger (dry bulb/ wet bulb) (°C)	Indoor heat exchanger (inlet/ outlet) (°C)	Compressor speed (Hz)	Fan motor speed (rpm)	Heating capacity (kW)	Power input (kW)
1E	7/6	47/55	43	560	4.0	1.82

E) ErP labelling

Test results

Test results of SCOP test at low temperature - heating season average – EN 14825

Model (Outdoor)	AM-NET-9-1PH
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	Y
Heat pump combination heater	N
Reversible	Y

Rated heat output[1)]	P_{rated}	**8.789** [kW]
Seasonal space heating energy efficiency	η_s	**177.4** [%]
	SCOP	**4.51** [-]

Measured capacity for heating for part load at outdoor temperature Tj	Average Climate - Low temperature application	Tj=-15 °C	Pdh	- [kW]
		Tj=-7 °C	Pdh	7.18 [kW]
		Tj=2 °C	Pdh	4.83 [kW]
		Tj=7 °C	Pdh	4.17 [kW]
		Tj=12 °C	Pdh	4.92 [kW]
		Tj=bivalent temperature	Pdh	7.18 [kW]
		Tj=operation limit	Pdh	6.27 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Low temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	2.69 [-]
		Tj=2 °C	COPd	4.42 [-]
		Tj=7 °C	COPd	6.31 [-]
		Tj=12 °C	COPd	8.29 [-]
		Tj=bivalent temperature	COPd	2.69 [-]
		Tj=operation limit	COPd	2.77 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit	TOL	-10 [°C]
temperatures	WTOL	- [°C]
Degradation coefficient	Cdh	0.95 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.018 [kW]
	Thermostat-off mode	P_{TO}	0.027 [kW]
	Standby mode	P_{SB}	0.018 [kW]
	Crankcase heater mode	P_{CK}	0.019 [kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	2.52 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Fixed
	Water flow rate		1050 [l/h]
	Annual energy consumption	Q_{HE}	4025 [kWh]

[1)]For heat pump space heaters and heat pump combination heaters, the rated heat output, Prated, is equal to the design load for heating, Pdesignh, and the rated heat output of a supplementary heater, Psup, is equal to the supplementary capacity for heating, sup(Tj).

[2)] For SCOP calculation the value PCK - PSB is used. See section "SCOP - detailed calculation"

Test results of SCOP test at medium temperature - heating season average – EN 14825

Model (Outdoor)	AM-NET-9-1PH
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	Y
Heat pump combination heater	N
Reversible	Y

Rated heat output[1]	P_{rated}	**7.071** [kW]
Seasonal space heating energy efficiency	η_s	**126.3** [%]
	SCOP	**3.23** [-]

Measured capacity for heating for part load at outdoor temperature Tj	Average Climate - Medium temperature application	Tj=-15 °C	Pdh	- [kW]
		Tj=-7 °C	Pdh	6.08 [kW]
		Tj=2 °C	Pdh	3.67 [kW]
		Tj=7 °C	Pdh	3.91 [kW]
		Tj=12 °C	Pdh	4.75 [kW]
		Tj=bivalent temperature	Pdh	6.08 [kW]
		Tj=operation limit	Pdh	5.09 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Medium temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	1.87 [-]
		Tj=2 °C	COPd	3.12 [-]
		Tj=7 °C	COPd	4.61 [-]
		Tj=12 °C	COPd	6.54 [-]
		Tj=bivalent temperature	COPd	1.87 [-]
		Tj=operation limit	COPd	1.52 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit	TOL	-10 [°C]
temperatures	WTOL	- [°C]
Degradation coefficient	Cdh	0.96 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.018 [kW]
	Thermostat-off mode	P_{TO}	0.027 [kW]
	Standby mode	P_{SB}	0.018 [kW]
	Crankcase heater mode	P_{CK}	0.019 [kW]
Supplementary heater[1]	Rated heat output	P_{SUP}	1.98 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Fixed
	Water flow rate		1030 [l/h]
	Annual energy consumption	Q_{HE}	4521 [kWh]

[1] For heat pump space heaters and heat pump combination heaters, the rated heat output, Prated, is equal to the design load for heating, Pdesignh, and the rated heat output of a supplementary heater, Psup, is equal to the supplementary capacity for heating, sup(Tj).

[2] For SCOP calculation the value PCK - PSB is used. See section "SCOP - detailed calculation"

COP test results - low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W35	5.992	5.023

COP test results - medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W55	9.375	2.501

Test results of sound power measurements – EN 12102-1

N#	Test conditions	Sound power level LW(A) [dB re 1pW]	Uncertainty σ_{tot} [dB]
1[E]	A7/W55	55.6	1.6

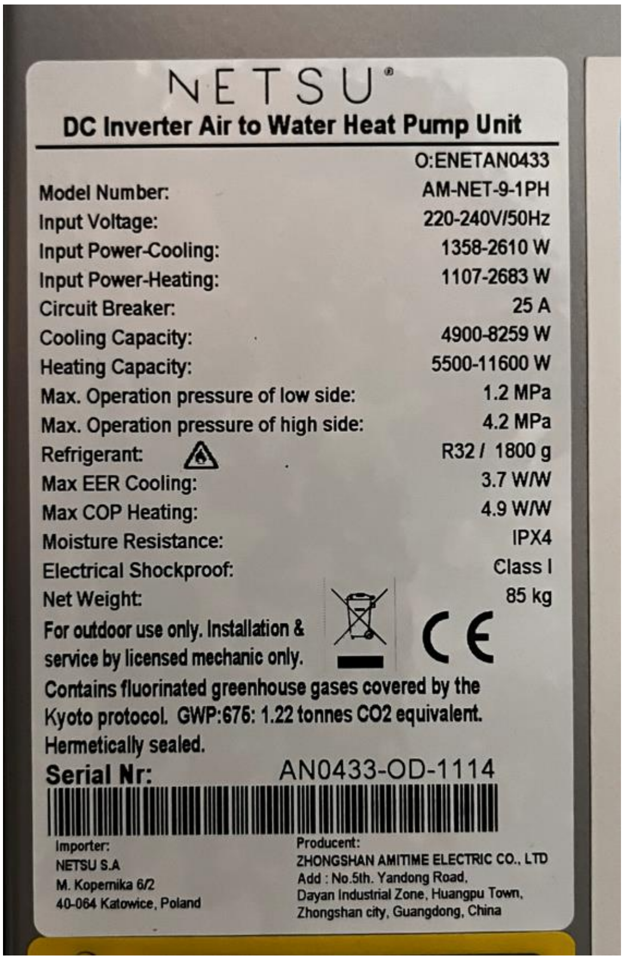
E) ErP labelling

The A-weighted total sound power level is determined for the measured frequency range from 100 Hz to 10 kHz. For the calculation of uncertainty, see appendix 1.

The sound power measurements are carried out by Kamalathasan Arumugam (KAMA) and co-read by Patrick Glibert (PGL), Danish Technological Institute.

Photos

Rating plate (outdoor unit)



Outdoor unit

Rating plate (indoor unit)

Indoor unit

SCOP - detailed calculation

Detailed SCOP calculation of low temperature and average climate conditions – EN 14825

Calculation of reference SCOP

$$SCOP = \frac{P_{designh} \times H_{he}}{\frac{P_{designh} \times H_{he}}{SCOP_{on}} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF}}$$

Where

P_{design} =	Heating load of the building at design temperature, kW
H_{he} =	Number of equivalent heating hours, 2066 h
H_{TO}, H_{SB}, H_{CK}, H_{OFF} =	Number of hours for which the unit is considered to work in thermostat off mode, standby mode, crankcase heater mode and off mode, h, respectively
P_{TO}, P_{SB}, P_{CK}, P_{OFF} =	Electricity consumption during thermostat off mode, standby mode, crankcase heater mode and off mode, kW, respectively

Data for SCOP

	Outdoor temperature [°C]	Part load ratio [%]	Part load [kW]	Declared capacity [kW]	Declared COP [-]	cdh [-]	CR [-]	COPbin [-]
A	-7	88	7.77	7.18	2.69	0.99	1.00	2.69
B	2	54	4.73	4.83	4.42	0.98	1.00	4.42
C	7	35	3.04	4.17	6.31	0.96	0.73	6.21
D	12	15	1.35	4.92	8.29	0.95	0.27	7.40
E	-10	100	8.79	6.27	2.77	0.99	1.00	2.77
F - BIV	-7	88	7.77	7.18	2.69	0.99	1.00	2.69

Energy consumption for thermostat off, standby, off mode, crankcase heater mode

	Hours [h]	Power input [kW]	Applied to SCOP calculation [kW]	Energy consumption [kWh]
Off mode	0	0.01849	0.01849	0
Thermostat off	178	0.02689	0.02689	4.78642
Standby	0	0.01849	0.01849	0
Crankcase heater	178	0.01855	6E-05	0.01068

Calculation Bin for $SCOP_{on}$

	Bin [-]	Outdoor temperature [°C]	Hours [h]	Heat load [kW]	Heat load covered by heat pump [kW]	Electrical back up heater [kW]	backup heater energy input [kWh]	COP_{bin} [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
E	21	-10	1	8.79	6.27	2.52	2.52	2.77	8.79	4.78	6.27	2.26
	22	-9	25	8.45	6.57	1.88	46.98	2.74	211.27	106.86	164.30	59.88
	23	-8	23	8.11	6.88	1.24	28.44	2.72	186.60	86.68	158.16	58.25
A / F - BIV	24	-7	24	7.77	7.18	0.00	0.00	2.69	186.60	69.45	186.60	69.45
	25	-6	27	7.44	6.91	0.00	0.00	2.88	200.79	69.75	200.79	69.75
	26	-5	68	7.10	6.64	0.00	0.00	3.07	482.72	157.19	482.72	157.19
	27	-4	91	6.76	6.37	0.00	0.00	3.26	615.23	188.55	615.23	188.55
	28	-3	89	6.42	6.09	0.00	0.00	3.45	571.62	165.45	571.62	165.45
	29	-2	165	6.08	5.82	0.00	0.00	3.65	1003.97	275.29	1003.97	275.29
	30	-1	173	5.75	5.55	0.00	0.00	3.84	994.17	258.97	994.17	258.97
	31	0	240	5.41	5.28	0.00	0.00	4.03	1298.07	322.02	1298.07	322.02
	32	1	280	5.07	5.00	0.00	0.00	4.22	1419.76	336.20	1419.76	336.20
B	33	2	320	4.73	4.73	0.00	0.00	4.42	1514.41	343.02	1514.41	343.02
	34	3	357	4.39	4.39	0.00	0.00	4.77	1568.84	328.58	1568.84	328.58
	35	4	356	4.06	4.06	0.00	0.00	5.13	1444.10	281.27	1444.10	281.27
	36	5	303	3.72	3.72	0.00	0.00	5.49	1126.68	205.08	1126.68	205.08
	37	6	330	3.38	3.38	0.00	0.00	5.85	1115.53	190.57	1115.53	190.57
C	38	7	326	3.04	3.04	0.00	0.00	6.21	991.80	159.63	991.80	159.63
	39	8	348	2.70	2.70	0.00	0.00	6.45	941.10	145.87	941.10	145.87
	40	9	335	2.37	2.37	0.00	0.00	6.69	792.70	118.50	792.70	118.50
	41	10	315	2.03	2.03	0.00	0.00	6.93	638.89	92.22	638.89	92.22
	42	11	215	1.69	1.69	0.00	0.00	7.17	363.39	50.71	363.39	50.71
D	43	12	169	1.35	1.35	0.00	0.00	7.40	228.51	30.86	228.51	30.86
	44	13	151	1.01	1.01	0.00	0.00	7.64	153.13	20.04	153.13	20.04
	45	14	105	0.68	0.68	0.00	0.00	7.88	70.99	9.01	70.99	9.01
	46	15	74	0.34	0.34	0.00	0.00	8.12	25.01	3.08	25.01	3.08

SUM	18154.69	4019.59	18076.76	3941.66
$SCOP_{on}$		4.52	**$SCOP_{net}$**	4.59

Detailed SCOP calculation of medium temperature and average climate conditions – EN 14825

Calculation of reference SCOP

$$SCOP = \frac{P_{designh} \times H_{he}}{\frac{P_{designh} \times H_{he}}{SCOP_{on}} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF}}$$

Where

P_{design} =	Heating load of the building at design temperature, kW
H_{he} =	Number of equivalent heating hours, 2066 h
H_{TO}, H_{SB}, H_{CK}, H_{OFF} =	Number of hours for which the unit is considered to work in thermostat off mode, standby mode, crankcase heater mode and off mode, h, respectively
P_{TO}, P_{SB}, P_{CK}, P_{OFF} =	Electricity consumption during thermostat off mode, standby mode, crankcase heater mode and off mode, kW, respectively

Data for SCOP

	Outdoor temperature [°C]	Part load ratio [%]	Part load [kW]	Declared capacity [kW]	Declared COP [-]	cdh [-]	CR [-]	COPbin [-]
A	-7	88	6.26	6.08	1.87	0.99	1.00	1.87
B	2	54	3.81	3.67	3.12	0.98	1.00	3.12
C	7	35	2.45	3.91	4.61	0.97	0.63	4.52
D	12	15	1.09	4.75	6.54	0.96	0.23	5.82
E	-10	100	7.07	5.09	1.52	0.99	1.00	1.52
F - BIV	-7	88	6.26	6.08	1.87	0.99	1.00	1.87

Energy consumption for thermostat off, standby, off mode, crankcase heater mode

	Hours [h]	Power input [kW]	Applied to SCOP calculation [kW]	Energy consumption [kWh]
Off mode	0	0.01849	0.01849	0
Thermostat off	178	0.02689	0.02689	4.78642
Standby	0	0.01849	0.01849	0
Crankcase heater	178	0.01855	6E-05	0.01068

Calculation Bin for $SCOP_{on}$

	Bin [-]	Outdoor temperature [°C]	Hours [h]	Heat load [kW]	Heat load covered by heat pump [kW]	Electrical back up heater [kW]	backup heater energy input [kWh]	COP_{bin} [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
E	21	-10	1	7.07	5.09	1.98	1.98	1.52	7.07	5.34	5.09	3.36
	22	-9	25	6.80	5.42	1.38	34.45	1.63	169.98	117.39	135.53	82.94
	23	-8	23	6.53	5.75	0.78	17.88	1.75	150.12	93.34	132.25	75.46
A / F - BIV	24	-7	24	6.26	6.08	0.00	0.00	1.87	150.12	80.24	150.12	80.24
	25	-6	27	5.98	5.81	0.00	0.00	2.01	161.55	80.37	161.55	80.37
	26	-5	68	5.71	5.54	0.00	0.00	2.15	388.36	180.71	388.36	180.71
	27	-4	91	5.44	5.27	0.00	0.00	2.29	494.97	216.32	494.97	216.32
	28	-3	89	5.17	5.01	0.00	0.00	2.43	459.89	189.47	459.89	189.47
	29	-2	165	4.90	4.74	0.00	0.00	2.57	807.73	314.73	807.73	314.73
	30	-1	173	4.62	4.47	0.00	0.00	2.71	799.84	295.64	799.84	295.64
	31	0	240	4.35	4.20	0.00	0.00	2.84	1044.33	367.13	1044.33	367.13
	32	1	280	4.08	3.93	0.00	0.00	2.98	1142.24	382.83	1142.24	382.83
B	33	2	320	3.81	3.67	0.00	0.00	3.12	1218.39	390.16	1218.39	390.16
	34	3	357	3.54	3.42	0.00	0.00	3.40	1262.17	370.94	1262.17	370.94
	35	4	356	3.26	3.18	0.00	0.00	3.68	1161.82	315.50	1161.82	315.50
	36	5	303	2.99	2.94	0.00	0.00	3.96	906.45	228.77	906.45	228.77
	37	6	330	2.72	2.69	0.00	0.00	4.24	897.47	211.56	897.47	211.56
C	38	7	326	2.45	2.45	0.00	0.00	4.52	797.94	176.46	797.94	176.46
	39	8	348	2.18	2.18	0.00	0.00	4.78	757.14	158.37	757.14	158.37
	40	9	335	1.90	1.90	0.00	0.00	5.04	637.75	126.54	637.75	126.54
	41	10	315	1.63	1.63	0.00	0.00	5.30	514.01	97.01	514.01	97.01
	42	11	215	1.36	1.36	0.00	0.00	5.56	292.36	52.61	292.36	52.61
D	43	12	169	1.09	1.09	0.00	0.00	5.82	183.85	31.61	183.85	31.61
	44	13	151	0.82	0.82	0.00	0.00	6.08	123.20	20.28	123.20	20.28
	45	14	105	0.54	0.54	0.00	0.00	6.33	57.11	9.02	57.11	9.02
	46	15	74	0.27	0.27	0.00	0.00	6.59	20.13	3.05	20.13	3.05

SUM	14605.97	4515.39	14551.67	4461.09
$SCOP_{on}$		3.23	**$SCOP_{net}$**	3.26

Detailed test results

Detailed SCOP part load test results - low temperature application - average climate – EN 14825

Detailed result for 'EN14825:2022' Average Low (A and F) A -7 /W34		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		A and F
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	8.79
Heating demand:	kW	7.77
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**7.181**
COP	-	**2.687**
Power consumption	kW	**2.673**
Measured		
Heating capacity	kW	7.231
COP	-	2.634
Power consumption	kW	2.745
During heating		
Air_inlet temperature dry bulb	°C	-7.01
Air temperature wet bulb	°C	-8.12
Water_inlet temperature	°C	27.96
water_outlet temperature	°C	33.90
Water_outlet temperature (Time averaged)	°C	**33.90**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	77252
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	73
Water Flow	m^3/s	0.000293

Detailed result for 'EN14825:2022' Average Low (B) A 2 /W30		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		B
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	8.79
Heating demand:	kW	4.73
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.825**
COP	-	**4.415**
Power consumption	kW	**1.093**
Measured		
Heating capacity	kW	4.875
COP	-	4.181
Power consumption	kW	1.166
During heating		
Air_inlet temperature dry bulb	°C	2.00
Air temperature wet bulb	°C	0.90
Water_inlet temperature	°C	26.01
water_outlet temperature	°C	30.01
Water_outlet temperature (Time averaged)	°C	**30.01**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	77300
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	73
Water Flow	m^3/s	0.000293

Detailed result for 'EN14825:2022' Average Low (C) A 7 /W27		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	8.79
Heating demand:	kW	3.04
CR:	-	0.7
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.172**
COP	-	**6.307**
Power consumption	kW	**0.661**
Measured		
Heating capacity	kW	4.222
COP	-	5.744
Power consumption	kW	0.735
During heating		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.00
Water_inlet temperature	°C	24.53
water_outlet temperature	°C	28.00
Water_outlet temperature (Time averaged)	°C	**27.06**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	78702
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	51
Calculated Power correction	W	74
Water Flow	m^3/s	0.000293

Detailed result for 'EN14825:2022' Average Low (D) A 12 /W24		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	8.79
Heating demand:	kW	1.35
CR:	-	0.3
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.919**
COP	-	**8.290**
Power consumption	kW	**0.593**
Measured		
Heating capacity	kW	4.969
COP	-	7.448
Power consumption	kW	0.667
During heating		
Air_inlet temperature dry bulb	°C	12.02
Air temperature wet bulb	°C	11.01
Water_inlet temperature	°C	22.89
water_outlet temperature	°C	26.97
Water_outlet temperature (Time averaged)	°C	**24.01**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	78749
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	51
Calculated Power correction	W	74
Water Flow	m^3/s	0.000293

Detailed result for 'EN14825:2022' Average Low (E) A -10 /W35		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Low
Condition name:		E
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	8.79
Heating demand:	kW	8.79
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**6.267**
COP	-	**2.772**
Power consumption	kW	**2.261**
Measured		
Heating capacity	kW	6.318
COP	-	2.706
Power consumption	kW	2.335
During heating		
Air_inlet temperature dry bulb	°C	-9.95
Air temperature wet bulb	°C	-11.07
Water_inlet temperature	°C	29.95
water_outlet temperature	°C	35.14
Water_outlet temperature (Time averaged)	°C	**35.14**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	79000
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	51
Calculated Power correction	W	74
Water Flow	m^3/s	0.000293

Detailed SCOP part load test results - medium temperature application - average climate – EN 14825

Detailed result for 'EN14825:2022' Average Medium (A and F) A -7 /W52		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		A and F
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	7.07
Heating demand:	kW	6.26
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**6.078**
COP	-	**1.871**
Power consumption	kW	**3.249**
Measured		
Heating capacity	kW	6.129
COP	-	1.845
Power consumption	kW	3.322
During heating		
Air_inlet temperature dry bulb	°C	-6.92
Air temperature wet bulb	°C	-8.06
Water_inlet temperature	°C	46.80
water_outlet temperature	°C	51.97
Water_outlet temperature (Time averaged)	°C	**51.97**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	79070
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	73
Water Flow	m^3/s	0.000287

Detailed result for 'EN14825:2022' Average Medium (B) A 2 /W42		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		B
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	7.07
Heating demand:	kW	3.81
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**3.667**
COP	-	**3.123**
Power consumption	kW	**1.174**
Measured		
Heating capacity	kW	3.717
COP	-	2.981
Power consumption	kW	1.247
During heating		
Air_inlet temperature dry bulb	°C	2.02
Air temperature wet bulb	°C	0.92
Water_inlet temperature	°C	38.90
water_outlet temperature	°C	42.02
Water_outlet temperature (Time averaged)	°C	**42.02**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	78044
Calculated Hydraulic power	W	22
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	72
Water Flow	m^3/s	0.000287

Detailed result for 'EN14825:2022' Average Medium (C) A 7 /W36		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	7.07
Heating demand:	kW	2.45
CR:	-	0.6
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**3.908**
COP	-	**4.608**
Power consumption	kW	**0.848**
Measured		
Heating capacity	kW	3.958
COP	-	4.297
Power consumption	kW	0.921
During heating		
Air_inlet temperature dry bulb	°C	6.98
Air temperature wet bulb	°C	5.97
Water_inlet temperature	°C	33.92
water_outlet temperature	°C	37.24
Water_outlet temperature (Time averaged)	°C	**36.00**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	79218
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	73
Water Flow	m^3/s	0.000287

Detailed result for 'EN14825:2022' Average Medium (D) A 12 /W30		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	7.07
Heating demand:	kW	1.09
CR:	-	0.2
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.752**
COP	-	**6.541**
Power consumption	kW	**0.726**
Measured		
Heating capacity	kW	4.802
COP	-	6.007
Power consumption	kW	0.799
During heating		
Air_inlet temperature dry bulb	°C	11.99
Air temperature wet bulb	°C	11.01
Water_inlet temperature	°C	29.07
water_outlet temperature	°C	33.09
Water_outlet temperature (Time averaged)	°C	**30.00**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	79200
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	73
Water Flow	m^3/s	0.000287

Detailed result for 'EN14825:2022' Average Medium (E) A -10 /W55		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Average
Temperature application:		Medium
Condition name:		E
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tbivalent	°C	-7
Tdesign	°C	-10
Pdesign	kW	7.07
Heating demand:	kW	7.07
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.093**
COP	-	**1.516**
Power consumption	kW	**3.360**
Measured		
Heating capacity	kW	5.143
COP	-	1.498
Power consumption	kW	3.433
During heating		
Air_inlet temperature dry bulb	°C	-10.00
Air temperature wet bulb	°C	-11.05
Water_inlet temperature	°C	50.55
water_outlet temperature	°C	54.90
Water_outlet temperature (Time averaged)	°C	**54.90**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	78373
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	72
Water Flow	m^3/s	0.000287

Detailed COP test results - low temperature – EN 14511

Detailed result for 'EN14511:2022' A7/W35		
Tested according to:		EN14511:2022
Minimum flow reached:		No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.992**
COP	-	**5.023**
Power consumption	kW	**1.193**
Measured		
Heating capacity	kW	6.042
COP	-	4.772
Power consumption	kW	1.266
During heating		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	5.98
Water_inlet temperature	°C	30.00
water_outlet temperature	°C	34.99
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	78258
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	73
Water Flow	m^3/s	0.000292

Detailed COP test results - medium temperature – EN 14511

Detailed result for 'EN14511:2022' A7/W55		
Tested according to:		EN14511:2022
Minimum flow reached:		No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**9.375**
COP	-	**2.501**
Power consumption	kW	**3.748**
Measured		
Heating capacity	kW	9.425
COP	-	2.467
Power consumption	kW	3.820
During heating		
Air_inlet temperature dry bulb	°C	7.02
Air temperature wet bulb	°C	5.99
Water_inlet temperature	°C	47.02
water_outlet temperature	°C	54.99
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	78557
Calculated Hydraulic power	W	23
Calculated global efficiency	η	0.31
Calculated Capacity correction	W	50
Calculated Power correction	W	72
Water Flow	m^3/s	0.000286

Detailed test results of sound power measurement – Test N#1

Sound power levels according to ISO 3743-1:2010

TEKNOLOGISK INSTITUT

Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms

Client: Netsu S.A — Date of test: 11-10-2024

Object: Type: Mono Air to water heat pump Model: AM-NET-9-1PH

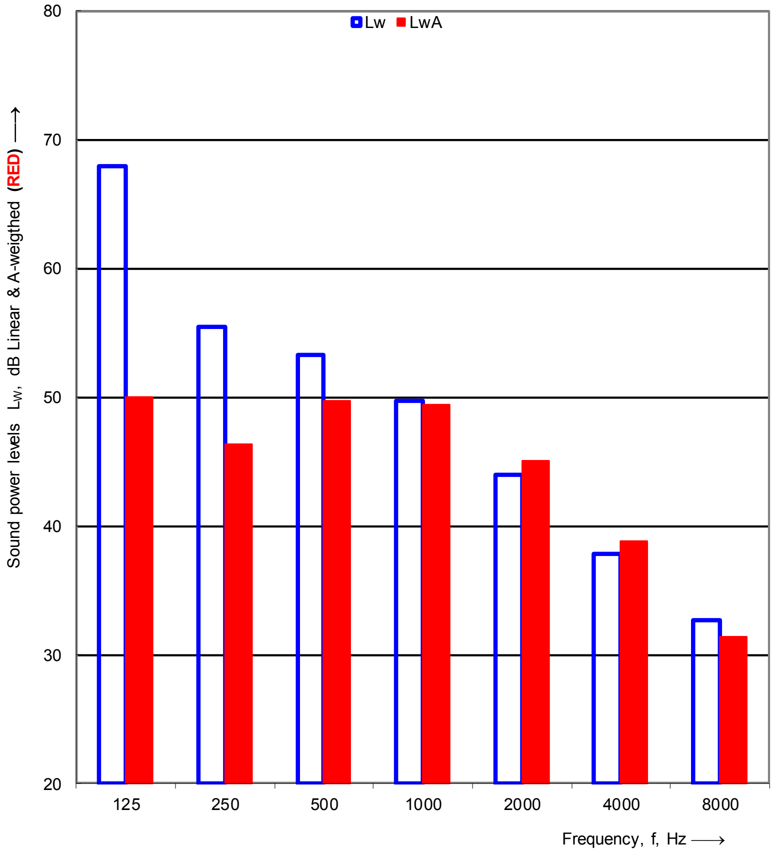
Mounting conditions: The outdoor unit is mounted on the supporting metal support frame using two pieces of vibration isolation mounts and placed on four pices of concrete tiles (49x49x5 cm). All of these are placed in a water drop dray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the outdoor unit has been measured in Test room 1.

Operating conditions: A7/W55, Compressor speed: 43[Hz], Fan speed: 560[rpm], Heating capacity: 4.0 [kW], Power_input: 1.82[kW], Water flow rate: 1030 [l/h] and dP_water: 780 [mbar]

Static pressure:	1009 hPa	Reference box:	
Air temperature:	7.0 °C	L1:	1.2 m
Relative air humidity:	84.0 %	L2:	0.4 m
Test room volume:	102.8 m³ (Room: Room 1)	L3:	0.8 m
Area, S, of test room:	138.9 m²	Volume:	0.4 m³

Frequency f [Hz]	L_W 1/3 octave [dB]	1/1 oct [dB]
100	66.7	
125	61.3	67.9
160	53.1	
200	52.5	
250	50.3	55.4
315	48.1	
400	50.4	
500	47.9	53.3
630	46.3	
800	46.9	
1000	43.7	49.7
1250	43.2	
1600	40.9	
2000	38.4	44.0
2500	37.6	
3150	33.9	
4000	33.7	37.8
5000	31.0	
6300	27.4	
8000	27.2	32.7 [2]
10000	29.0	

[2] Correction



Sound power level L_W(A): 55.6 dB [re 1pW] **Uncertainty** σ**tot:** 1.6 dB

Name of test institute: DTI — Date: 11-10-2024

No. of test report: 300-KLAB-24-037

Measurements are in full conformity with ISO 3743-1

Appendix 1

Unit specification

Type of unit: Mono air to water heat pump
Manufacturer: Netsu S.A.
Size of the heat pump: 0.4 x 1.2 x 0.8m (W x L x H)
Year of production: n/a.

Operating conditions and environment

The operating conditions of the unit under test fulfill the requirements for Class A.

The acoustic test chamber is a hard wall reverberant room (103 m^3) and equipped with relevant sound diffusing reflector panels. The acoustic test chamber fulfils the requirements of ISO3743-1 accuracy grade 2 (engineering grade).

Measurements of the average sound pressure levels in 1/3 octave frequency bands are carried out using three microphones in the test chamber. During the measurements, the microphones are traversed up and down for one meter in the arc of a quarter circle.

The picture below shows the installation of the unit during test, position of microphones, sound diffusing reflector panels, and the reference sound source.

Measurement instruments

Id nr.	Manufacturer	Description	Calibration company
100864*	GRAS	Gras 40AE_26CA, ½" free field microphone, Room 1	Norsonic A/S, Norway
100865*	GRAS	Gras 40AE_26CA, ½" free field microphone, Room 1	Norsonic A/S, Norway
100866*	GRAS	Gras 40AE_26CA, ½" free field microphone, Room 1	Norsonic A/S, Norway
100867	GRAS	Gras 40AE_26CA, ½" free field microphone, Room 2	Norsonic A/S, Norway
100868	GRAS	Gras 40AE_26CA, ½" free field microphone, Room 2	Norsonic A/S, Norway
100869	GRAS	Gras 40AE_26CA, ½" free field microphone, Room 2	Norsonic A/S, Norway
100870	GRAS	Gras 40AE_26CA, ½" free field microphone, Roof monitor	Norsonic A/S, Norway
100873*	Brüel & Kjær	Acoustical calibrator, Brüel & Kjær 4231	Element Metech, Denmark
100859*	Norsonic	Reference sound source, Norsonic Nor278 Room 1	RISE, Sweden
100872	Norsonic	Reference sound source, Norsonic Nor278 Room 2	RISE, Sweden
100620*	Norsonic	Multi-channel measurement system Nor850	Norsonic A/S, Norway

*Instruments are used for the actual measurements for the calculation of the test results.

The other instruments are used for control measurements.
All microphones are equipped with windshields.

Test Procedure

The measurements of the emitted sound power level from the heat pump are carried out according to the following standards:

- DS/EN 14511:2022
- EN 12102-1:2022
- ISO/EN 3743-1:2010

The basic acoustic measurement standard DS/EN 3743-1 is a comparison method using a calibrated reference sound source. Two series of sound pressure measurements are made under exactly the same acoustic conditions, e.g., the same microphone positions, temperature and air humidity. The calibrated sound power levels are known for the reference sound source at each frequency band, and they are used in the estimation of the acoustical correction factor for the calculation of the sound power emitted from the unit under test. The background noise levels are measured and used for relevant corrections.

The final total A-weighted sound power level is based on measurements and calculations in 1/3-octave levels, which then are summed into 1/1-octave levels. The A-weighted total sound power level is determined for the measured frequency range from 100 Hz to 10 kHz.

The actual microphone positions and correction values are saved in data files linked to the complete project documentation according to the DANAK-accreditation.

The complete measurement system is documented and regularly calibrated according to DANAK.

The detailed description of the measurement method is given in Danish in the quality database system "QA Web" at Danish Technological Institute, which is accessible by DANAK.

Measurement uncertainty

The uncertainty of sound power level in decibel is determined in accordance with ISO 3743-1, equation 22 $\sigma_{tot} = \sqrt{{\sigma_{RO}}^2 + {\sigma_{omc}}^2}$ where:

- σ_{RO} is the standard deviation of the reproducibility of the method
- σ_{omc} is the standard deviation describing the uncertainty associated with the instability of the operating and mounting conditions for the particular noise source during test.

σ_{RO} expresses the uncertainty in test results delivered by the different accredited test laboratories due to different instrumentation and implementation of measurement procedure as well different radiation characteristics of the noise source during test.

σ_{omc} expresses the uncertainty associated with the instability of the operating and mounting conditions for the particular noise source during test. The mounting and installation conditions in two DTI acoustic test chambers are well defined in the test procedure. Possible instability of the operating conditions is monitored and assessed prior to each noise test.

The test uncertainty σ_{omc} is calculated according to ISO3743-1 Annex C formula C.1 and is typically below 1.0dB. However, the uncertainty is rounded up to the nearest 0.5 or 1.0dB increment in the report. As pr. Table C.1 (accuracy grade 2), the uncertainty σ_{RO} is set to 1.5.

The expanded uncertainty U is calculated according to ISO 3743-1 equation 23:
$U = k\,\sigma_{tot}$ where k = 2 for 95% confidence.

EXAMPLE: $\sigma_{tot}: \sqrt{1.5^2 + 0.5^2} = 1.6\ dB$ and $U(95\%) = 3.2\ dB$

Note: The expanded uncertainty does not include the standard deviation of production which is used in ISO4871 for the purpose of making noise declaration for batches of machines.

OŚWIADCZENIE

Producent NETSU S.A. oświadcza, iż pompy ciepła

1) AM-NET-9-1PH, AM-NET-IDU-1PH
Oznaczenie/typ/identyfikator modelu

2) AM-NET-6-1PH, AM-NET-IDU-1PH
Oznaczenie/typ/identyfikator modelu

3)
Oznaczenie/typ/identyfikator modelu

4)
Oznaczenie/typ/identyfikator modelu

5)
Oznaczenie/typ/identyfikator modelu

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

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

Katowice 21.10.2024
Miejscowość, data

NETSU | Paweł Kaproń
Prezes Zarządu
NETSU S.A.

Podpis osoby upoważnionej

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KRS: 0000672969
REGON: 366145226

[Tłumaczenie przysięgłe z języka angielskiego.]

[na każdej stronie raportu umieszczono logo Duńskiego Instytutu Technologicznego – Danish Technological Institute oraz na dole strony logo E DIN Gepruft ilac-MRA DANAK Nr rej. badań]

Raport z badań

Nr raportu:
300-KLAB-24-037

Teknologiparken
Kongsvang Allé 29
DK-8000 Aarhus C
+45 72 20 20 00
info@teknologisk.dk
www.teknologisk.dk

Strona 1 z 32
Init: RTHI/PRES
Nr pliku: 256295
Załączniki: 1

Klient:	Firma:	NETSU S.A
	Adres:	ul. Żeliwna 38 lok. 0.10
	Miasto:	40-599 Katowice, Polska
	Tel:	+48 323070055
Komponent:	Marka:	NETSU
	Typ:	Pompa ciepła powietrze-woda (mono blok)
	Model:	Jednostka zewnętrzna: AM-NET-9-1PH Jednostka wewnętrzna: AM-NET-IDU-1PH
	Nr serii:	Jednostka zewnętrzna: AN0433-OD1114 Jednostka wewnętrzna: AN0433-ID-1064
	Rok prod:	Jednostka zewnętrzna: NIE DOTYCZY Jednostka wewnętrzna: NIE DOTYCZY
Daty:	Okres badań:	wrzesień – październik 2024

Procedury Patrz cel (strona 2), aby zapoznać się z listą norm.

Uwagi: Urządzenie zostało dostarczone przez klienta. Instalacja i ustawienia testowe zostały wykonane zgodnie z instrukcjami producenta. Czujnik temperatury wody wylotowej wewnątrz jednostki wewnętrznej został wyciągnięty z pochwy czujnika w celu przeprowadzenia testu A-10W55. Na potrzeby testu dźwiękowego zmieniono niektóre ustawienia, takie jak przegrzanie, temperatura nawiewu i otwarcie EEV, ponieważ jednostka nie mogła osiągnąć temperatury przepływu wody 55°C przy ustawieniach fabrycznych.

Warunki: Niniejszy test został przeprowadzony w ramach akredytacji zgodnie z międzynarodowymi wymogami (ISO/IEC 17025:2017) oraz zgodnie z Ogólnymi Warunkami Duńskiego Instytutu Technologicznego. Wyniki testu odnoszą się wyłącznie do testowanego produktu. Niniejszy raport z testu może być cytowany we fragmentach wyłącznie za pisemną zgodą Duńskiego Instytutu Technologicznego.

Klient nie może wspominać ani odnosić się do Duńskiego Instytutu Technologicznego lub pracowników Duńskiego Instytutu Technologicznego w celach reklamowych lub marketingowych, chyba że Duński Instytut Technologiczny wyrazi na to pisemną zgodę w każdym przypadku.

Oddział/Centrum: Duński Instytut Technologiczny
Energia i klimat
Laboratorium pomp ciepła, Aarhus

Data: 2024.10.18

Podpis:
Rasmus Thisgaard
B.TecMan & MarEng

Współczytający:
Preben Eskerod
B.TecMan & MarEng
[logo]
E DIN Gepruft ilac -MRA I DANAK
nr rej badań 300

[logo] dokument podpisany elektronicznie
18 października 2024 r.
Duński Instytut Technologiczny

TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO
DANUTA ZALEWSKA

Cel

Celem niniejszego raportu jest udokumentowanie następujących kwestii:

Sezonowy współczynnik wydajności (SCOP) w niskiej i średniej temperaturze dla klimatu umiarkowanego zgodnie z normą EN 14825:2022.

W celu obliczenia SCOP przeprowadzono badania w warunkach obciążenia częściowego podanych w tabelach na stronie 4 i 5.

Standardowe warunki znamionowe testu COP A7/W35 i A7/W55 zgodnie z normą EN 14511:2022.

Pomiary mocy akustycznej zgodnie z normą EN 12102-1:2022.

[logo]
E DIN Gepruft ilac -MRA I DANAK
nr rej badań 300

Wyniki badań

Wyniki badań SCOP w niskiej temperaturze – umiarkowany sezon grzewczy (A) – EN 14825

Model (zewnętrzny)	AM-NET -9-1PH
Pompa ciepła powietrze-woda, monoblok	Y
Niskotemperaturowa pompa ciepła	N
Wyposażona w dodatkową grzałkę	y
Kombinowana pompa ciepła i grzałka	N
Odwracalne	y

Znamionowa moc cieplna [1)]	P_{rated}	**8.789** [kW]
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	η_s	**177.4** [%]
	SCOP	**4.51** [-]

Zmierzona wydajność ogrzewania dla częściowego obciążenia przy temperaturze zewnętrznej Tj	Klimat umiarkowany - Zastosowanie w niskiej temperaturze	Tj=-15°C	Pdh	- [kW]
		Tj=-7°C	Pdh	7.18 [kW]
		Tj=2°C	Pdh	4.83 [kW]
		Tj=7°C	Pdh	4.17 [kW]
		Tj=12°C	Pdh	4.92 [kW]
		Tj=temperatura biwalentna	Pdh	7.18 [kW]
		Tj=graniczna temperatura robocza	Pdh	6.27 [kW]

Zmierzony współczynnik efektywności przy temperaturze zewnętrznej Tj	Klimat umiarkowany - Zastosowanie w niskiej temperaturze	Tj=-15°C	COPd	- [kW]
		Tj=-7°C	COPd	2.69 [kW]
		Tj=2°C	COPd	4.42 [kW]
		Tj=7°C	COPd	6.31kW]
		Tj=12°C	COPd	8.29 [kW]
		Tj=temperatura biwalentna	COPd	2.69 [kW]
		Tj=graniczna temperatura robocza	COPd	2.77 [kW]

Temperatura biwalentna	$T_{bivalent}$	-7 [°C]
Graniczna temperatura robocza	TOL	-10 [°C]
Temperatury	WTOL	- [°C]
Współczynnik strat	Cdh	0.95 [-]

Zużycie energii w trybach innych niż tryb aktywny	Tryb wyłączenia	P_{OFF}	0.018 [kW]
	Tryb wyłączenia termostatu	P_{TO}	0.027 [kW]
	Tryb czuwania	P_{SB}	0.018 [kW]
	Tryb włączonej grzałki karteru [2)]	P_{CK}	0.019 [kW]
Grzałka dodatkowa [1)]	Znamionowa moc ogrzewania	P_{SUP}	2.52 [kW]
	Rodzaj zasilania		Elektryczne

Inne pozycje	Regulacja wydajności		Zmienna
	Regulacja przepływu wody		Stała
	Prędkość przepływu wody		1050 [l/h]
	Roczne zużycie energii	Q_{HE}	4025 [kWh]

1) W przypadku ogrzewaczy pomieszczeń z pompą ciepła i wielofunkcyjnych ogrzewaczy z pompą ciepła – znamionowa moc cieplna, Prated, jest równa projektowemu obciążeniu ogrzewania, Pdesignh, a znamionowa moc cieplna grzałki dodatkowej, Psup, jest równa dodatkowej wydajności ogrzewania sup(Tj).

[2)] Do obliczenia SCOP używana jest wartość PCK - PSB. Proszę zapoznać się z sekcją „SCOP - szczegółowe obliczenia".

Wyniki badań SCOP w średniej temperaturze – umiarkowany sezon grzewczy (A)– EN 14825

Model (zewnętrzny)	AM-NET -9-1PH
Pompa ciepła powietrze-woda, monoblok	Y
Niskotemperaturowa pompa ciepła	N
Wyposażona w dodatkową grzałkę	Y
Kombinowana pompa ciepła i grzałka	N
Odwracalny	Y

Znamionowa moc cieplna [1)]	P_{rated}	**7.071** [kW]
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	η_s	**126.3** [%]
	SCOP	**3.23** [-]

Zmierzona wydajność ogrzewania dla częściowego obciążenia przy temperaturze zewnętrznej Tj	Klimat umiarkowany - Zastosowanie w średniej temperaturze	Tj=-15°C	Pdh	- [kW]
		Tj=-7°C	Pdh	6.08 [kW]
		Tj=2°C	Pdh	3.67 [kW]
		Tj=7°C	Pdh	3.91 [kW]
		Tj=12°C	Pdh	4.75 [kW]
		Tj=temperatura biwalentna	Pdh	6.08 [kW]
		Tj=graniczna temperatura robocza	Pdh	5.09 [kW]

Zmierzony współczynnik efektywności przy temperaturze zewnętrznej Tj	Klimat umiarkowany - Zastosowanie w średniej temperaturze	Tj=-15°C	COPd	- [kW]
		Tj=-7°C	COPd	1.87 [kW]
		Tj=2°C	COPd	3.12 [kW]
		Tj=7°C	COPd	4.61 [kW]
		Tj=12°C	COPd	6.54 [kW]
		Tj=temperatura biwalentna	COPd	1.87 [kW]
		Tj=graniczna temperatura robocza	COPd	1.52 [kW]

Temperatura biwalentna	$T_{bivalent}$	-7 [°C]
Graniczna temperatura robocza	TOL	-10 [°C]
Temperatury	WTOL	- [°C]
Współczynnik strat	Cdh	0.96 [-]

Zużycie energii w trybach innych niż tryb aktywny	Tryb wyłączenia	P_{OFF}	0.018 [kW]
	Tryb wyłączenia termostatu	P_{TO}	0.027 [kW]
	Tryb czuwania	P_{SB}	0.018 [kW]
	Tryb włączonej grzałki karteru	P_{CK}	0.019 [kW]
Grzałka dodatkowa [1)]	Znamionowa moc ogrzewania	P_{SUP}	1.98 [kW]
	Rodzaj zasilania		Elektryczne

Inne pozycje	Regulacja wydajności	Zmienna	
	Regulacja przepływu wody	Stała	
	Prędkość przepływu wody	1030	
	Roczne zużycie energii	Q_{HE}	4521[kWh]

[1)] W przypadku ogrzewaczy pomieszczeń z pompą ciepła i wielofunkcyjnych ogrzewaczy z pompą ciepła – znamionowa moc cieplna, Prated, jest równa projektowemu obciążeniu ogrzewania, Pdesignh, a znamionowa moc cieplna grzałki dodatkowej, Psup, jest równa dodatkowej wydajności ogrzewania sup(Tj).

[2)] Do obliczenia SCOP używana jest wartość PCK - PSB. Proszę zapoznać się z sekcją „SCOP - szczegółowe obliczenia".

Wyniki testów punktów testowych COP w niskiej temperaturze - EN 14511

Nr	Warunki testowe	Moc grzewcza [kW]	COP
1	A7/W35	5.992	5.023

Wyniki testów punktów testowych COP w średniej temperaturze - EN 14511

Nr	Warunki testowe	Moc grzewcza [kW]	COP
1	A7/W55	9.375	2.501

Wyniki pomiarów mocy akustycznej - EN 12102-1

Nr	Warunki testowe	Poziom mocy akustycznej LW(A) [dB re 1pW]	Niepewność σtot (dB) (wartość ważona)
1E	A7/W55	55.6	1.6

E) Etykietowanie ErP

Całkowity poziom mocy akustycznej skorygowany charakterystyką A jest określany dla mierzonego zakresu częstotliwości od 100 Hz do 10 kHz. W celu obliczenia niepewności proszę zapoznać się z załącznikiem 1.

Pomiary mocy akustycznej są przeprowadzane przez Kamalathasana Arumugama (KAMA) i współodczytywane przez Patricka Gliberta (PGL) z Duńskiego Instytutu Technologicznego.

*Ja, **Danuta Zalewska**, tłumacz przysięgły języka angielskiego w Gdańsku, zarejestrowana na liście tłumaczy przysięgłych w **Ministerstwie Sprawiedliwości** pod numerem **TP/4109/05**, zaświadczam zgodność niniejszego tłumaczenia z treścią oryginału dokumentu okazanego mi w języku angielskim.*

Koniec tłumaczenia 7 stron *Gdańsk, 21/10/2024* *Rep.: 159/2024*