TEST REPORT

Report no.:
300-KLAB-23-023-rev. 2.

DANISH TECHNOLOGICAL INSTITUTE

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Customer:	Company:	Klima-Therm AB
	Address:	Ögärdesvägen 17
	City:	S-433 30 PARTILLE
	Tel.:	+46 313366530
Component:	Brand:	Kaisai
	Type:	Air to water heat pump (mono bloc)
	Model:	Unit: KHY-12PY3
	Series no.:	Unit: KHY-12PY3K000001
	Prod. year:	Unit: N.a.
Dates:	Component tested:	August 2023 and May 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. All tests are done with enabled defrost mode. This report was revised because COP A7/W35 and ErP sound measurements were added. This report replaces 300-KLAB-23-023- rev. 1 issued 24.07.25 because of a typing mistake in "Test results of sound power measurements – EN 12102"	

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

Date: 2024.09.30

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DIGITALLY SIGNED DOCUMENT
30 September 2024
DANISH TECHNOLOGICAL INSTITUTE

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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 14825:2018. In order to calculate the SCOP, tests were carried out at the part load conditions stated in the tables on page 4 and 6.

COP test point at low temperature (heating mode) according to EN 14511:2018 at A7/W35.

COP test point at medium temperature (heating mode) according to EN 14511:2018 at A7W55.

Sound power measurements according to EN 12102-1:2017 for ErP labelling.

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.

Condition	Part Load Ratio in %				Outdoor heat exchanger		Indoor heat exchanger			
					Inlet dry (wet) bulb temperature °C		Fixed outlet °C	Variable outlet[d] °C		
	Formula	A	W	C	Outdoor air	Exhaust air	All climates	A	W	C
A	$(-7 - 16) / (T_{designh} - 16)$	88	n/a	61	−7(−8)	20(12)	[a] / 35	[a] / 34	n/a	[a] / 30
B	$(+2 - 16) / (T_{designh} - 16)$	54	100	37	2(1)	20(12)	[a] / 35	[a] / 30	[a] / 35	[a] / 27
C	$(+7 - 16) / (T_{designh} - 16)$	35	64	24	7(6)	20(12)	[a] / 35	[a] / 27	[a] / 31	[a] / 25
D	$(+12 - 16) / (T_{designh} - 16)$	15	29	11	12(11)	20(12)	[a] / 35	[a] / 24	[a] / 26	[a] / 24
E	$(TOL - 16) / (T_{designh} - 16)$				TOL	20(12)	[a] / 35	[a] / [b]	[a] / [b]	[a] / [b]
F	$(T_{bivalent} - 16) / (T_{designh} - 16)$				$T_{bivalent}$	20(12)	[a] / 35	[a] / [c]	[a] / [c]	[a] / [c]
G	$(-15 - 16) / (T_{designh} - 16)$	n/a	n/a	82	−15	20(12)	[a] / 35	n/a	n/a	[a] / 32

[a] With the water flow rate as determined at the standard rating conditions given in EN 14511-2 at 30/35 conditions for units with a fixed water flow rate, and with a fixed delta T of 5 K for units with a variable flow rate. If the resulting flow rate is below the minimum flow rate then this minimum flow rate is used with the outlet temperature.

[b] Variable outlet shall be calculated by interpolation from $T_{designh}$ and the temperature which is closest to the TOL.

[c] Variable outlet shall be calculated by interpolation between the upper and lower temperatures which are closest to the bivalent temperature.

[d] If the variable outlet temperature is below the minimum of the operation range of the unit, this minimum should be considered.

Additional information

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

Test conditions	Compressor speed average climate (Hz)
A & F	68
B	31
C	30
D	30
E	80

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.

Condition	Part Load Ratio in %				Outdoor heat exchanger		Indoor heat exchanger			
					Inlet dry (wet) bulb temperature °C		Fixed outlet °C	Variable outlet[d] °C		
	Formula	A	W	C	Outdoor air	Exhaust air	All climates	A	W	C
A	$(-7 - 16) / (T_{designh} - 16)$	88	n/a	61	−7(−8)	20(12)	[a] / 55	[a] / 52	n/a	[a] / 44
B	$(+2 - 16) / (T_{designh} - 16)$	54	100	37	2(1)	20(12)	[a] / 55	[a] / 42	[a] / 55	[a] / 37
C	$(+7 - 16) / (T_{designh} - 16)$	35	64	24	7(6)	20(12)	[a] / 55	[a] / 36	[a] / 46	[a] / 32
D	$(+12 - 16) / (T_{designh} - 16)$	15	29	11	12(11)	20(12)	[a] / 55	[a] / 30	[a] / 34	[a] / 28
E	$(TOL - 16) / (T_{designh} - 16)$				TOL	20(12)	[a] / 55	[a] / [b]	[a] / [b]	[a] / [b]
F	$(T_{bivalent} - 16) / (T_{designh} - 16)$				$T_{bivalent}$	20(12)	[a] / 55	[a] / [c]	[a] / [c]	[a] / [c]
G	$(-15 - 16) / (T_{designh} - 16)$	n/a	n/a	82	−15	20(12)	[a] / 55	n/a	n/a	[a] / 49

[a] With the water flow rate as determined at the standard rating conditions given in EN 14511–2 at 47/55 conditions for units with a fixed water flow rate, and with a fixed delta T of 8 K for units with a variable flow rate. If the resulting flow rate is below the minimum flow rate then this minimum flow rate is used with the outlet temperature.

[b] Variable outlet shall be calculated by interpolation $T_{designh}$ and the temperature which is closest to the TOL.

[c] Variable outlet shall be calculated by interpolation between the upper and lower temperatures which are closest to the bivalent temperature.

[d] If the variable outlet temperature is below the minimum of the operation range of the unit, this minimum should be considered.

Additional information

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

Test conditions	Compressor speed average climate (Hz)
A & F	69
B	33
C	30
D	30
E	83

Test conditions for COP test points at low temperature – EN 14511

N#	Heat source		Heat sink		Compressor speed (Hz)
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1	7	6	30	35	58

Test conditions for COP test points at medium temperature – EN 14511

N#	Heat source		Heat sink		Compressor speed (Hz)
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1	7	6	47	55	85

Test conditions for sound power measurements – EN 12102-1

N#	Test condition		Heat pump setting			
	Outdoor heat exchanger (dry bulb/ wet bulb) (°C)	Indoor heat exchanger (inlet/ outlet) (°C)	Compressor speed (Hz)	Fan speed Outdoor (rpm)	Heating capacity (kW)	Power input (kW)
1	7/6	50.7/55	33	Na.	5.5	1.87

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Test results

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

Model (Outdoor)	KHY-12PY3
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	N
Heat pump combination heater	N

Rated heat output[1)]	P_{rated}		**9** [kW]
Seasonal space heating energy efficiency	η_s		**173.2** [%]
	SCOP		**4.41** [-]

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	8.30 [kW]
		Tj=2 °C	Pdh	4.82 [kW]
		Tj=7 °C	Pdh	5.67 [kW]
		Tj=12 °C	Pdh	6.60 [kW]
		Tj=bivalent temperature	Pdh	8.30 [kW]
		Tj=operation limit	Pdh	9.04 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Low temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	3.13 [-]
		Tj=2 °C	COPd	4.20 [-]
		Tj=7 °C	COPd	5.70 [-]
		Tj=12 °C	COPd	7.29 [-]
		Tj=bivalent temperature	COPd	3.13 [-]
		Tj=operation limit	COPd	2.80 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit	TOL	-10 [°C]
temperatures	WTOL	- [°C]
Degradation coefficient	Cdh	0.98 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.010 [kW]
	Thermostat-off mode	P_{TO}	0.019 [kW]
	Standby mode	P_{SB}	0.010 [kW]
	Crankcase heater mode	P_{CK}	0.010 [kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	0.00 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Fixed
	Water flow rate		-
	Annual energy consumption	Q_{HE}	4220 [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).

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

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

Model (Outdoor)	KHY-12PY3
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	N
Heat pump combination heater	N

Rated heat output[1)]	P_{rated}	**9** [kW]
Seasonal space heating energy efficiency	η_s	**137.6** [%]
	SCOP	**3.51** [-]

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	7.94 [kW]
		Tj=2 °C	Pdh	5.08 [kW]
		Tj=7 °C	Pdh	5.50 [kW]
		Tj=12 °C	Pdh	6.44 [kW]
		Tj=bivalent temperature	Pdh	7.94 [kW]
		Tj=operation limit	Pdh	8.78 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Medium temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	2.31 [-]
		Tj=2 °C	COPd	3.42 [-]
		Tj=7 °C	COPd	4.58 [-]
		Tj=12 °C	COPd	5.93 [-]
		Tj=bivalent temperature	COPd	2.31 [-]
		Tj=operation limit	COPd	2.03 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit temperatures	TOL	-10 [°C]
	WTOL	- [°C]
Degradation coefficient	Cdh	0.98 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.010 [kW]
	Thermostat-off mode	P_{TO}	0.019 [kW]
	Standby mode	P_{SB}	0.010 [kW]
	Crankcase heater mode	P_{CK}	0.010 [kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	0.22 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Fixed
	Water flow rate		-
	Annual energy consumption	Q_{HE}	5291 [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).

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

Test results of COP test points at low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W35	9.94	4.49

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

Test results of COP test points at medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
2	A7/W55	10,36	3.04

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

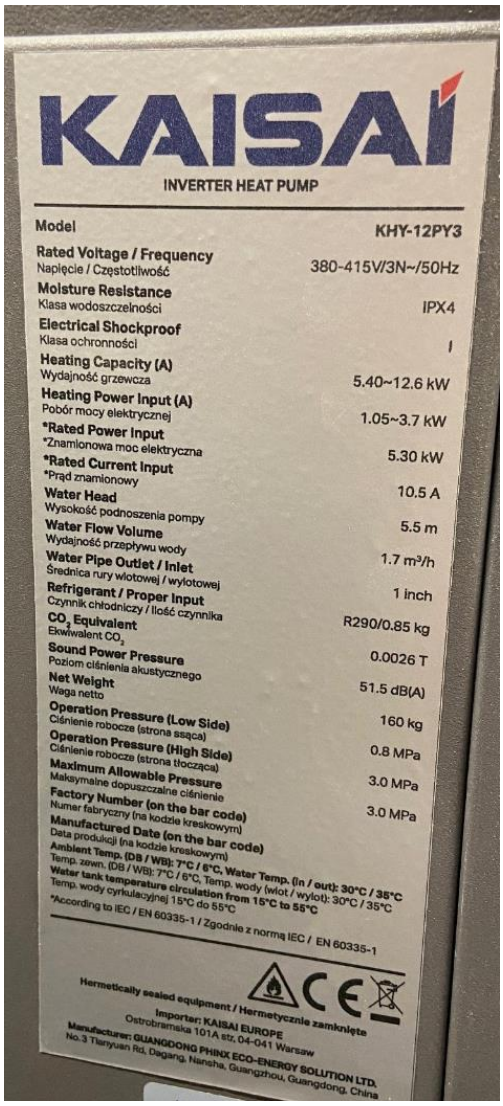
Test results of sound power measurements – EN 12102

N#	Test conditions	Sound power level LW(A) [dB re 1pW]	Uncertainty (dB) (weighted value)
1	A7W55	64.0	0.5

Tests are executed by Kamalathasan Aramugam, Danish Technological Institute.

Photo

Rating plate



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	7.96	8.30	3.13	0.99	1.00	3.13
B	2	54	4.85	4.82	4.20	0.98	1.00	4.20
C	7	35	3.12	5.67	5.70	0.98	0.55	5.61
D	12	15	1.38	6.60	7.29	0.98	0.21	6.76
E	-10	100	9.00	9.04	2.80	0.99	1.00	2.80
F - BIV	-7	88	7.96	8.30	3.13	0.99	1.00	3.13

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	3672	0.01	0.01	36.72
Thermostat off	178	0.019	0.019	3.382
Standby	0	0.01	0.01	0
Crankcase heater	3850	0.01	0	0

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	9.00	9.00	0.00	0.00	2.80	9.00	3.22	9.00	3.22
	22	-9	25	8.65	8.65	0.00	0.00	2.91	216.35	74.45	216.35	74.45
	23	-8	23	8.31	8.31	0.00	0.00	3.02	191.08	63.33	191.08	63.33
A / F - BIV	24	-7	24	7.96	7.96	0.00	0.00	3.13	191.08	61.09	191.08	61.09
	25	-6	27	7.62	7.61	0.00	0.00	3.25	205.62	63.31	205.62	63.31
	26	-5	68	7.27	7.26	0.00	0.00	3.37	494.31	146.81	494.31	146.81
	27	-4	91	6.92	6.91	0.00	0.00	3.49	630.00	180.69	630.00	180.69
	28	-3	89	6.58	6.56	0.00	0.00	3.61	585.35	162.32	585.35	162.32
	29	-2	165	6.23	6.21	0.00	0.00	3.73	1028.08	275.95	1028.08	275.95
	30	-1	173	5.88	5.86	0.00	0.00	3.85	1018.04	264.76	1018.04	264.76
	31	0	240	5.54	5.51	0.00	0.00	3.96	1329.23	335.27	1329.23	335.27
	32	1	280	5.19	5.17	0.00	0.00	4.08	1453.85	355.98	1453.85	355.98
B	33	2	320	4.85	4.82	0.00	0.00	4.20	1550.77	368.91	1550.77	368.91
	34	3	357	4.50	4.48	0.00	0.00	4.48	1606.50	358.24	1606.50	358.24
	35	4	356	4.15	4.14	0.00	0.00	4.77	1478.77	310.33	1478.77	310.33
	36	5	303	3.81	3.80	0.00	0.00	5.05	1153.73	228.65	1153.73	228.65
	37	6	330	3.46	3.46	0.00	0.00	5.33	1142.31	214.45	1142.31	214.45
C	38	7	326	3.12	3.12	0.00	0.00	5.61	1015.62	181.12	1015.62	181.12
	39	8	348	2.77	2.77	0.00	0.00	5.84	963.69	165.09	963.69	165.09
	40	9	335	2.42	2.42	0.00	0.00	6.07	811.73	133.78	811.73	133.78
	41	10	315	2.08	2.08	0.00	0.00	6.30	654.23	103.89	654.23	103.89
	42	11	215	1.73	1.73	0.00	0.00	6.53	372.12	57.01	372.12	57.01
D	43	12	169	1.38	1.38	0.00	0.00	6.76	234.00	34.63	234.00	34.63
	44	13	151	1.04	1.04	0.00	0.00	6.99	156.81	22.44	156.81	22.44
	45	14	105	0.69	0.69	0.00	0.00	7.22	72.69	10.07	72.69	10.07
	46	15	74	0.35	0.35	0.00	0.00	7.45	25.62	3.44	25.62	3.44

SUM	18590.54	4179.25	18590.54	4179.25
$SCOP_{on}$		4.45	**$SCOP_{net}$**	4.45

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	7.96	7.94	2.31	0.99	1.00	2.31
B	2	54	4.85	5.08	3.42	0.99	1.00	3.42
C	7	35	3.12	5.50	4.58	0.98	0.57	4.52
D	12	15	1.38	6.44	5.93	0.98	0.22	5.57
E	-10	100	9.00	8.78	2.03	1.00	1.00	2.03
F - BIV	-7	88	7.96	7.94	2.31	0.99	1.00	2.31

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	3672	0.01	0.01	36.72
Thermostat off	178	0.019	0.019	3.382
Standby	0	0.01	0.01	0
Crankcase heater	3850	0.01	0	0

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	9.00	8.78	0.22	0.22	2.03	9.00	4.54	8.78	4.32
	22	-9	25	8.65	8.50	0.16	3.89	2.12	216.35	103.95	212.46	100.06
	23	-8	23	8.31	8.22	0.09	2.02	2.21	191.08	87.39	189.05	85.36
A / F - BIV	24	-7	24	7.96	7.94	0.00	0.00	2.31	191.08	82.86	191.08	82.86
	25	-6	27	7.62	7.60	0.00	0.00	2.43	205.62	84.63	205.62	84.63
	26	-5	68	7.27	7.25	0.00	0.00	2.55	494.31	193.62	494.31	193.62
	27	-4	91	6.92	6.91	0.00	0.00	2.68	630.00	235.39	630.00	235.39
	28	-3	89	6.58	6.57	0.00	0.00	2.80	585.35	209.07	585.35	209.07
	29	-2	165	6.23	6.22	0.00	0.00	2.92	1028.08	351.69	1028.08	351.69
	30	-1	173	5.88	5.88	0.00	0.00	3.05	1018.04	334.15	1018.04	334.15
	31	0	240	5.54	5.53	0.00	0.00	3.17	1329.23	419.30	1329.23	419.30
	32	1	280	5.19	5.19	0.00	0.00	3.29	1453.85	441.42	1453.85	441.42
B	33	2	320	4.85	4.85	0.00	0.00	3.42	1550.77	453.84	1550.77	453.84
	34	3	357	4.50	4.50	0.00	0.00	3.64	1606.50	441.60	1606.50	441.60
	35	4	356	4.15	4.15	0.00	0.00	3.86	1478.77	383.23	1478.77	383.23
	36	5	303	3.81	3.81	0.00	0.00	4.08	1153.73	282.80	1153.73	282.80
	37	6	330	3.46	3.46	0.00	0.00	4.30	1142.31	265.62	1142.31	265.62
C	38	7	326	3.12	3.12	0.00	0.00	4.52	1015.62	224.63	1015.62	224.63
	39	8	348	2.77	2.77	0.00	0.00	4.73	963.69	203.70	963.69	203.70
	40	9	335	2.42	2.42	0.00	0.00	4.94	811.73	164.30	811.73	164.30
	41	10	315	2.08	2.08	0.00	0.00	5.15	654.23	127.03	654.23	127.03
	42	11	215	1.73	1.73	0.00	0.00	5.36	372.12	69.43	372.12	69.43
D	43	12	169	1.38	1.38	0.00	0.00	5.57	234.00	42.01	234.00	42.01
	44	13	151	1.04	1.04	0.00	0.00	5.78	156.81	27.13	156.81	27.13
	45	14	105	0.69	0.69	0.00	0.00	5.99	72.69	12.14	72.69	12.14
	46	15	74	0.35	0.35	0.00	0.00	6.20	25.62	4.13	25.62	4.13

SUM	18590.54	5249.59	18584.41	5243.46
$SCOP_{on}$		3.54	**$SCOP_{net}$**	3.54

Detailed test results

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

Detailed result for 'EN14825:2018' Average Low (A and F) A -7 /W34		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	7.96
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**8.301**
COP	-	**3.128**
Power consumption	kW	**2.654**
Measured		
Heating capacity	kW	8.357
COP	-	3.054
Power consumption	kW	2.736
During heating		
Air temperature dry bulb	°C	-6.99
Air temperature wet bulb	°C	-8.24
Inlet temperature	°C	29.77
Outlet temperature	°C	34.02
Outlet temperature (Time averaged)	°C	**34.02**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	56928
Calculated Hydraulic power	W	27
Calculated global efficiency	η	0.33
Calculated Capacity correction	W	55
Calculated Power correction	W	82
Water Flow	m^3/s	0.000472

Detailed result for 'EN14825:2018' Average Low (B) A 2 /W30		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	4.85
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.816**
COP	-	**4.204**
Power consumption	kW	**1.146**
Measured		
Heating capacity	kW	4.871
COP	-	3.967
Power consumption	kW	1.228
During heating		
Air temperature dry bulb	°C	2.00
Air temperature wet bulb	°C	0.89
Inlet temperature	°C	27.49
Outlet temperature	°C	29.97
Outlet temperature (Time averaged)	°C	**29.97**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	57156
Calculated Hydraulic power	W	27
Calculated global efficiency	η	0.33
Calculated Capacity correction	W	55
Calculated Power correction	W	82
Water Flow	m^3/s	0.000472

Detailed result for 'EN14825:2018' Average Low (C) A 7 /W27		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	3.12
CR:	-	0.5
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.672**
COP	-	**5.695**
Power consumption	kW	**0.996**
Measured		
Heating capacity	kW	5.728
COP	-	5.313
Power consumption	kW	1.078
During heating		
Air temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.00
Inlet temperature	°C	25.41
Outlet temperature	°C	28.32
Outlet temperature (Time averaged)	°C	**27.01**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	56726
Calculated Hydraulic power	W	27
Calculated global efficiency	η	0.33
Calculated Capacity correction	W	55
Calculated Power correction	W	82
Water Flow	m^3/s	0.000472

Detailed result for 'EN14825:2018' Average Low (D) A 12 /W24		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	1.38
CR:	-	0.2
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**6.595**
COP	-	**7.292**
Power consumption	kW	**0.904**
Measured		
Heating capacity	kW	6.650
COP	-	6.743
Power consumption	kW	0.986
During heating		
Air temperature dry bulb	°C	12.02
Air temperature wet bulb	°C	11.02
Inlet temperature	°C	23.40
Outlet temperature	°C	26.78
Outlet temperature (Time averaged)	°C	**24.11**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	56636
Calculated Hydraulic power	W	27
Calculated global efficiency	η	0.33
Calculated Capacity correction	W	55
Calculated Power correction	W	82
Water Flow	m^3/s	0.000472

Detailed result for 'EN14825:2018' Average Low (E) A -10 /W35		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	9.00
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**9.043**
COP	-	**2.795**
Power consumption	kW	**3.236**
Measured		
Heating capacity	kW	9.098
COP	-	2.742
Power consumption	kW	3.318
During heating		
Air temperature dry bulb	°C	-10.00
Air temperature wet bulb	°C	-10.95
Inlet temperature	°C	30.37
Outlet temperature	°C	35.00
Outlet temperature (Time averaged)	°C	**35.00**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	57078
Calculated Hydraulic power	W	27
Calculated global efficiency	η	0.33
Calculated Capacity correction	W	55
Calculated Power correction	W	82
Water Flow	m^3/s	0.000472

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

Detailed result for 'EN14825:2018' Average Medium (A and F) A -7 /W52		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	7.96
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**7.941**
COP	-	**2.306**
Power consumption	kW	**3.444**
Measured		
Heating capacity	kW	7.993
COP	-	2.271
Power consumption	kW	3.520
During heating		
Air temperature dry bulb	°C	-6.99
Air temperature wet bulb	°C	-7.80
Inlet temperature	°C	45.60
Outlet temperature	°C	51.93
Outlet temperature (Time averaged)	°C	**51.93**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	78822
Calculated Hydraulic power	W	24
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	52
Calculated Power correction	W	76
Water Flow	m^3/s	0.000306

Detailed result for 'EN14825:2018' Average Medium (B) A 2 /W42		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	4.85
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.080**
COP	-	**3.417**
Power consumption	kW	**1.487**
Measured		
Heating capacity	kW	5.132
COP	-	3.283
Power consumption	kW	1.563
During heating		
Air temperature dry bulb	°C	2.02
Air temperature wet bulb	°C	0.86
Inlet temperature	°C	37.90
Outlet temperature	°C	41.95
Outlet temperature (Time averaged)	°C	**41.95**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	79351
Calculated Hydraulic power	W	24
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	52
Calculated Power correction	W	76
Water Flow	m^3/s	0.000306

Detailed result for 'EN14825:2018' Average Medium (C) A 7 /W36		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	3.12
CR:	-	0.6
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.495**
COP	-	**4.576**
Power consumption	kW	**1.201**
Measured		
Heating capacity	kW	5.547
COP	-	4.343
Power consumption	kW	1.277
During heating		
Air temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	5.99
Inlet temperature	°C	33.63
Outlet temperature	°C	38.00
Outlet temperature (Time averaged)	°C	**36.11**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	79311
Calculated Hydraulic power	W	24
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	52
Calculated Power correction	W	76
Water Flow	m^3/s	0.000306

Detailed result for 'EN14825:2018' Average Medium (D) A 12 /W30		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	1.38
CR:	-	0.2
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**6.438**
COP	-	**5.925**
Power consumption	kW	**1.087**
Measured		
Heating capacity	kW	6.490
COP	-	5.582
Power consumption	kW	1.163
During heating		
Air temperature dry bulb	°C	12.01
Air temperature wet bulb	°C	11.00
Inlet temperature	°C	28.91
Outlet temperature	°C	34.02
Outlet temperature (Time averaged)	°C	**30.01**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	79168
Calculated Hydraulic power	W	24
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	52
Calculated Power correction	W	76
Water Flow	m^3/s	0.000306

Detailed result for 'EN14825:2018' Average Medium (E) A -10 /W55		
Tested according to:		EN14511:2018 and EN14825:2018
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	9.00
Heating demand:	kW	9.00
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**8.777**
COP	-	**2.032**
Power consumption	kW	**4.319**
Measured		
Heating capacity	kW	8.828
COP	-	2.009
Power consumption	kW	4.394
During heating		
Air temperature dry bulb	°C	-9.99
Air temperature wet bulb	°C	-11.07
Inlet temperature	°C	47.99
Outlet temperature	°C	54.99
Outlet temperature (Time averaged)	°C	**54.99**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	78480
Calculated Hydraulic power	W	24
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	52
Calculated Power correction	W	76
Water Flow	m^3/s	0.000306

Detailed test results for COP test point – EN 14511

Detailed result for 'EN14511:2018' A7/W55		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**10.366**
COP	-	**3.044**
Power consumption	kW	**3.405**
Measured		
Heating capacity	kW	10.419
COP	-	2.992
Power consumption	kW	3.482
During heating		
Air temperature dry bulb	°C	7.01
Air temperature wet bulb	°C	5.78
Inlet temperature	°C	46.88
Outlet temperature	°C	55.14
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	80333
Calculated Hydraulic power	W	25
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	52
Calculated Power correction	W	77
Water Flow	m^3/s	0.000306

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	**9.943**
COP	-	**4.490**
Power consumption	kW	**2.214**
Measured		
Heating capacity	kW	9.997
COP	-	4.356
Power consumption	kW	2.295
During heating		
Air_inlet temperature dry bulb	°C	7.10
Air temperature wet bulb	°C	5.98
Water_inlet temperature	°C	29.90
water_outlet temperature	°C	34.99
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	55534
Calculated Hydraulic power	W	26
Calculated global efficiency	η	0.32
Calculated Capacity correction	W	55
Calculated Power correction	W	81
Water Flow	m^3/s	0.000472

Detailed test results of sound power measurement

Sound power levels according to ISO 3743-1:2010

TEKNOLOGISK INSTITUT

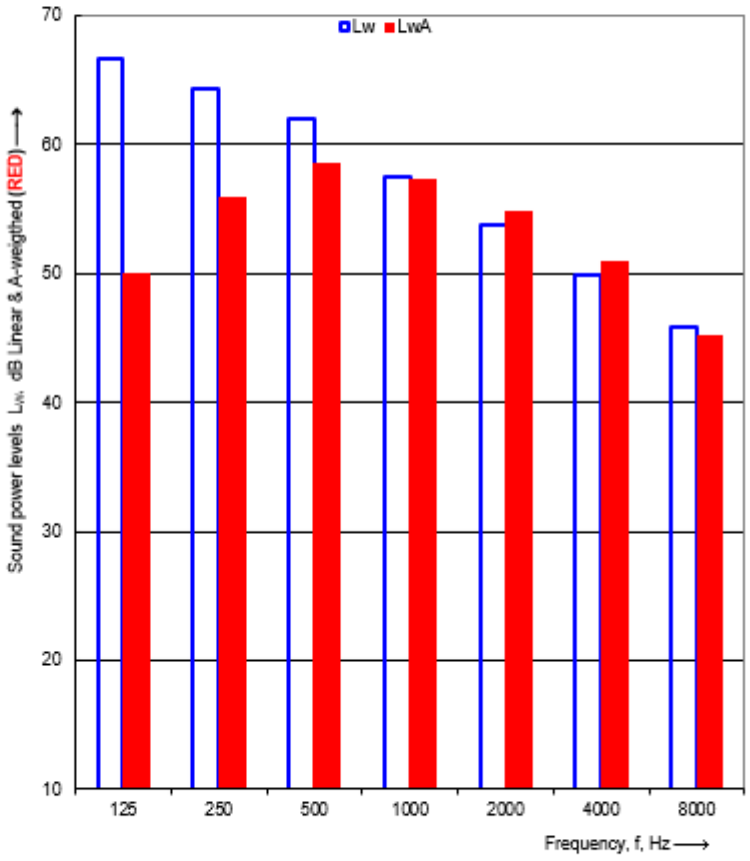
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms

Client:	Klima-Therm AB	Date of test:	12-04-2023
Object:	Type: Air to water heat pump, Model: KHY-12PY3		
Mounting conditions:	The out door unit is mounted on the supporting metal support frame using four vibration damping rubber feets, supplied by the manufacture. The support is placed in a water drop tray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the out door unit has been measured in Test room 2.		
Operating conditions:	A7/W55, Compressor speed: 33 [Hz], Fan speed: na. [rpm], Heating capacity: 5.5 [kW], Power_input: 1.87 [kW], Water flow rate: 1100 [l/h], dP_water : 800 [mBar]		

Static pressure:	1005 kPa			Reference box:	
Air temperature:	7.0 °C			L1:	1.3 m
Relative air humidity:	84.0 %			L2:	0.5 m
Test room volume:	102.8 m³	Room:	Room 2	L3:	0.9 m
Area, S, of test room:	138.9 m²			Volume:	0.6 m³

Frequency f [Hz]	L_w 1/3 octave [dB]	1/1 oct [dB]
100	64.2	
125	61.0	66.7
160	59.1	
200	58.8	
250	61.2	64.4
315	58.3	
400	58.7	
500	56.9	62.0
630	55.7	
800	54.5	
1000	52.1	57.6
1250	51.0	
1600	50.0	
2000	49.3	53.7
2500	46.9	
3150	45.9	
4000	45.4	49.9
5000	43.8	
6300	42.7	
8000	40.7	45.9
10000	39.4	

[1] Diff. to backgr. noise < 6dB



Sound power level L_w(A) 64 dB [re 1pW]

Name of test institute:	DTI	Date:	12-04-2023
No. of test report:	300-KLAB-23-003		

Measurements are in full conformity with ISO 3743

Appendix 1: Test Procedure

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

- DS/EN 14511:2018
- EN 12102-1:2017
- ISO/EN 3743-1

The basic acoustic measurement standard ISO/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 tested heat pump. 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 uncertainty is estimated on the weighted standard deviations in 1/1-octave levels.

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.

TEST REPORT

Report no.:
300-KLAB-23-023-rev. 2.

DANISH TECHNOLOGICAL INSTITUTE

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Init: PRES/RTHI/HSG
File no.: 207461
Enclosures: 0

Customer:

Company:	Klima-Therm AB
Address:	Ögärdesvägen 17
City:	S-433 30 PARTILLE
Tel.:	+46 313366530

Component:

Brand:	Kaisai
Type:	Air to water heat pump (mono bloc)
Model:	Unit: KHY-12PY3
Series no.:	Unit: KHY-12PY3K000001
Prod. year:	Unit: N.a.

Dates: Component tested: August 2023 and May 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. All tests are done with enabled defrost mode. This report was revised because COP A7/W35 and ErP sound measurements were added. This report replaces 300-KLAB-23-023- rev. 1 issued 24.07.25 because of a typing mistake in "Test results of sound power measurements – EN 12102"

Terms: This test was conducted under accreditation in accordance with international requirements (ISO/IEC 17025:2017) and in accordance with the General Terms and Conditions of Danish Technological Institute. The test results solely apply to the tested item. This test report may be quoted in extract only if Danish Technological Institute has granted its written consent.

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

Date: 2024.09.30

Signature:
Preben Eskerod
B. TecMan & MarEng

Co-reader:
Henning Schumann Grindorf
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DIGITALLY SIGNED DOCUMENT
30 September 2024
DANISH TECHNOLOGICAL INSTITUTE

ilac-MRA 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 14825:2018. In order to calculate the SCOP, tests were carried out at the part load conditions stated in the tables on page 4 and 6.

COP test point at low temperature (heating mode) according to EN 14511:2018 at A7/W35.

COP test point at medium temperature (heating mode) according to EN 14511:2018 at A7W55.

Sound power measurements according to EN 12102-1:2017 for ErP labelling.

Test results

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

Model (Outdoor)	KHY-12PY3
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	N
Heat pump combination heater	N

Rated heat output[1)]	P_{rated}	**9** [kW]
Seasonal space heating energy efficiency	η_s	**173.2** [%]
	SCOP	**4.41** [-]

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	8.30 [kW]
		Tj=2 °C	Pdh	4.82 [kW]
		Tj=7 °C	Pdh	5.67 [kW]
		Tj=12 °C	Pdh	6.60 [kW]
		Tj=bivalent temperature	Pdh	8.30 [kW]
		Tj=operation limit	Pdh	9.04 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Low temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	3.13 [-]
		Tj=2 °C	COPd	4.20 [-]
		Tj=7 °C	COPd	5.70 [-]
		Tj=12 °C	COPd	7.29 [-]
		Tj=bivalent temperature	COPd	3.13 [-]
		Tj=operation limit	COPd	2.80 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit temperatures	TOL	-10 [°C]
	WTOL	- [°C]
Degradation coefficient	Cdh	0.98 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.010 [kW]
	Thermostat-off mode	P_{TO}	0.019 [kW]
	Standby mode	P_{SB}	0.010 [kW]
	Crankcase heater mode	P_{CK}	0.010 [kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	0.00 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Fixed
	Water flow rate		-
	Annual energy consumption	Q_{HE}	4220 [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).

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

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

Model (Outdoor)	KHY-12PY3
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	N
Heat pump combination heater	N

Rated heat output[1)]	P_{rated}	**9** [kW]
Seasonal space heating energy efficiency	η_s	**137.6** [%]
	SCOP	**3.51** [-]

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	7.94 [kW]
		Tj=2 °C	Pdh	5.08 [kW]
		Tj=7 °C	Pdh	5.50 [kW]
		Tj=12 °C	Pdh	6.44 [kW]
		Tj=bivalent temperature	Pdh	7.94 [kW]
		Tj=operation limit	Pdh	8.78 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Medium temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	2.31 [-]
		Tj=2 °C	COPd	3.42 [-]
		Tj=7 °C	COPd	4.58 [-]
		Tj=12 °C	COPd	5.93 [-]
		Tj=bivalent temperature	COPd	2.31 [-]
		Tj=operation limit	COPd	2.03 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit temperatures	TOL	-10 [°C]
	WTOL	- [°C]
Degradation coefficient	Cdh	0.98 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.010 [kW]
	Thermostat-off mode	P_{TO}	0.019 [kW]
	Standby mode	P_{SB}	0.010 [kW]
	Crankcase heater mode	P_{CK}	0.010 [kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	0.22 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Fixed
	Water flow rate		-
	Annual energy consumption	Q_{HE}	5291 [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).

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

Test results of COP test points at low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W35	9.94	4.49

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

Test results of COP test points at medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
2	A7/W55	10,36	3.04

Tests are executed by Rasmus Thisgaard, Danish Technological Institute.

Test results of sound power measurements – EN 12102

N#	Test conditions	Sound power level LW(A) [dB re 1pW]	Uncertainty (dB) (weighted value)
1	A7W55	64.0	0.5

Tests are executed by Kamalathasan Aramugam, Danish Technological Institute.

Detailed test results of sound power measurement

Sound power levels according to ISO 3743-1:2010

TEKNOLOGISK INSTITUT

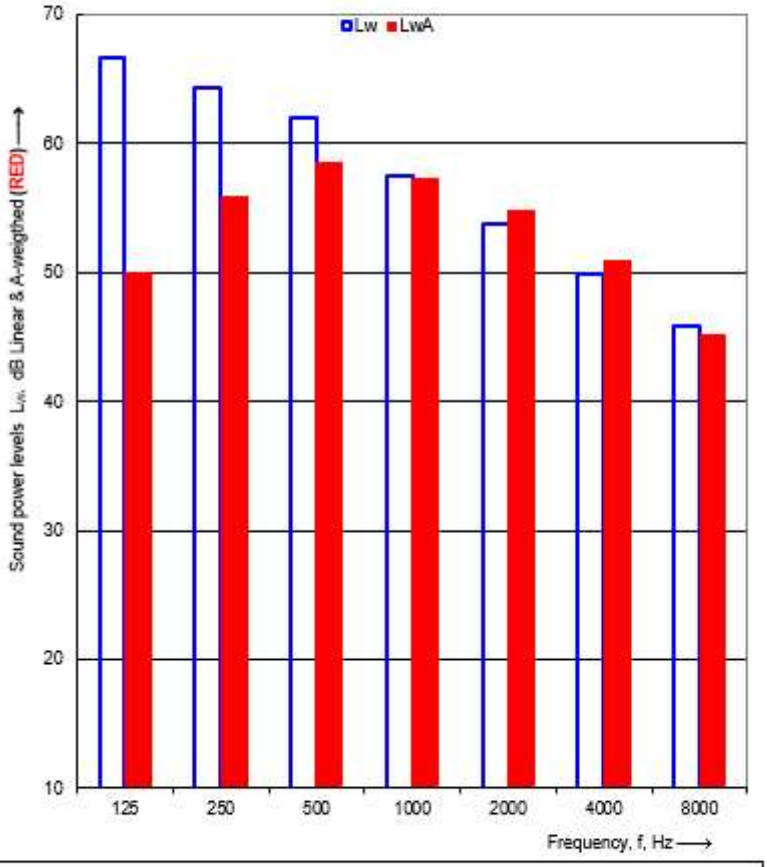
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms

Client:	Klima-Therm AB	Date of test:	12-04-2023
Object:	Type: Air to water heat pump, Model: KHY-12PY3		
Mounting conditions:	The out door unit is mounted on the supporting metal support frame using four vibration damping rubber feets, supplied by the manufacture. The support is placed in a water drop tray on two pieces of heavy concrete tiles (90x90x10cm) laying on a vibration damping mat on the floor. The noise radiated by the out door unit has been measured in Test room 2.		
Operating conditions:	A7/W55, Compressor speed: 33 [Hz], Fan speed: na. [rpm], Heating capacity: 5.5 [kW], Power_input: 1.87 [kW], Water flow rate: 1100 [l/h], dP_water : 800 [mBar]		

Static pressure:	1005 kPa			Reference box:	
Air temperature:	7.0 °C			L1:	1.3 m
Relative air humidity:	84.0 %			L2:	0.5 m
Test room volume:	102.8 m³	Room:	Room 2	L3:	0.9 m
Area, S, of test room:	138.9 m²			Volume:	0.6 m³

Frequency f [Hz]	L_w 1/3 octave [dB]	1/1 oct [dB]
100	64.2	
125	61.0	66.7
160	59.1	
200	58.8	
250	61.2	64.4
315	58.3	
400	58.7	
500	56.9	62.0
630	55.7	
800	54.5	
1000	52.1	57.6
1250	51.0	
1600	50.0	
2000	49.3	53.7
2500	46.9	
3150	45.9	
4000	45.4	49.9
5000	43.8	
6300	42.7	
8000	40.7	45.9
10000	39.4	

[1] Diff. to backgr. noise < 6dB



Sound power level L_w(A) 64 dB [re 1pW]

Name of test institute:	DTI	Date:	12-04-2023
No. of test report:	300-KLAB-23-003		

Measurements are in full conformity with ISO 3743

Appendix 1: Test Procedure

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

- DS/EN 14511:2018
- EN 12102-1:2017
- ISO/EN 3743-1

The basic acoustic measurement standard ISO/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 tested heat pump. 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 uncertainty is estimated on the weighted standard deviations in 1/1-octave levels.

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.

Tłumacz Przysięgły Języka Angielskiego– Danuta Zalewska, ul. Kossaka 6/1, 80-249 Gdańsk, tel./fax (058) 341 76 04

[Tłumaczenie przysięgłe z języka angielskiego.]

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

Raport z badań

Nr raportu:
300-KLAB-23-023-rev2.

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

Init: PRES/RTHI/HSG
Nr pliku: 207461
Załączniki: 0

Klient:	Firma:	Klima-Therm AB
	Adres:	Ögärdesvägen 17
	Miasto:	S-433 30 PARTILLE
	Tel:	+46 313366530
Komponent:	Marka:	Kaisai
	Typ:	Pompa ciepła powietrze-woda (mono blok)
	Model:	Jednostka: KHY-12PY3
	Nr serii:	Jednostka: KHY-12PY3K000001
	Rok prod:	Jednostka: NIE DOTYCZY
Daty:	Okres badań:	sierpień 2023 i maj 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. Wszystkie testy wykonano z włączonym trybem odszraniania. Niniejszy raport został poprawiony, ponieważ dodano pomiary dźwięku COP A7/W35 i ErP. Niniejszy raport zastępuje 300-KLAB-23-023-wer.1 wydany 24.07.25 z powodu błędu w pisowni w „Wyniki testu pomiarów mocy akustycznej- EN 12102".

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

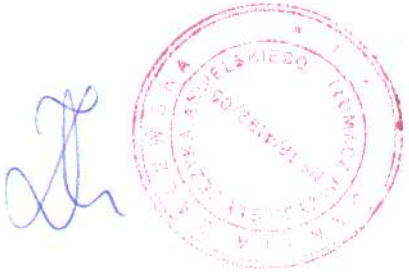
Podpis:
Preben Eskerod
B.TecMan & MarEng

Data: 2024.09.30

Współczytający:
Henning Schumann Grindorf
B.TecMan & MarEng

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

[logo] dokument podpisany elektronicznie
30 września 2024 r.
Duński Instytut Technologiczny



Cel

Celem niniejszego raportu jest udokumentowanie następujących kwestii:

Sezonowy współczynnik wydajności (SCOP) w niskiej i średniej temperaturze dla klimatu umiarkowanego zgodnie z normą EN 14825:2018.W celu obliczenia SCOP przeprowadzono badania w warunkach obciążenia częściowego podanych w tabelach na stronie 4 i 6.

Punkt testowy COP w niskiej temperaturze (tryb ogrzewania) zgodnie z normą EN 14511:2018 przy A7/W35.

Punkt testowy COP w średniej temperaturze (tryb ogrzewania) zgodnie z normą EN 14511:2018 przy A7W55.

Pomiary mocy akustycznej zgodnie z normą EN 12102-1:2017 dla etykiet ErP.

Wyniki badań

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

Model (zewnętrzny)	KHY-12PY3
Pompa ciepła powietrze-woda, monoblok	Y
Niskotemperaturowa pompa ciepła	N
Wyposażona w dodatkową grzałkę	N
Kombinowana pompa ciepła i grzałka	N

Znamionowa moc cieplna [1]	P_{rated}	**9** [kW]
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	η_s	**173,2** [%]
	SCOP	**4,41** [-]

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	8,30 [kW]
		Tj=2°C	Pdh	4,82 [kW]
		Tj=7°C	Pdh	5,67 [kW]
		Tj=12°C	Pdh	6,60 [kW]
		Tj=temperatura dwuwartościowa	Pdh	8,30 [kW]
		Tj=graniczna temperatura robocza	Pdh	9,04 [kW]

Zmierzony współczynnik efektywności przy temperaturze zewnętrznej Tj	Klimat umiarkowany - Zastosowanie w niskiej temperaturze	Tj=-15°C	COPd	- [kW]
		Tj=-7°C	COPd	3,13 [kW]
		Tj=2°C	COPd	4,20 [kW]
		Tj=7°C	COPd	5,70 [kW]
		Tj=12°C	COPd	7,29 [kW]
		Tj=temperatura dwuwartościowa	COPd	3,13 [kW]
		Tj=graniczna temperatura robocza	COPd	2,80 [kW]

Temperatura dwuwartościowa	$T_{bivalent}$	-7 [°C]
Graniczna temperatura robocza	TOL	-10 [°C]
Temperatury	WTOL	- [°C]
Współczynnik strat	Cdh	0,98 [-]

Zużycie energii w trybach innych niż tryb aktywny	Tryb wyłączenia	P_{OFF}	0,010 [kW]
	Tryb wyłączenia termostatu	P_{TO}	0,019 [kW]
	Tryb czuwania	P_{SB}	0,010 [kW]
	Tryb włączonej grzałki karteru [2]	P_{CK}	0,010 [kW]
Grzałka dodatkowa [1]	Znamionowa moc ogrzewania	P_{SUP}	0,00 [kW]
	Rodzaj zasilania		Elektryczne

Inne pozycje	Regulacja wydajności	Zmienna	
	Regulacja przepływu wody	Stała	
	Prędkość przepływu wody	-	
	Roczne zużycie energii	Q_{HE}	4220 [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).

Badania wykonane prze Rasmusa Thisgaarda, Duński Instytut Technologiczny.

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

Model (zewnętrzny)	KHY-12PY3
Pompa ciepła powietrze-woda, monoblok	Y
Niskotemperaturowa pompa ciepła	N
Wyposażona w dodatkową grzałkę	N
Kombinowana pompa ciepła i grzałka	N

Znamionowa moc cieplna [1]	P_{rated}	**9** [kW]	
Sezonowa efektywność energetyczna ogrzewania pomieszczeń	η_s	**137,6** [%]	
	SCOP	**3,51** [-]	

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	7,94 [kW]
		Tj=2°C	Pdh	5,08 [kW]
		Tj=7°C	Pdh	5,50 [kW]
		Tj=12°C	Pdh	6,44 [kW]
		Tj=temperatura dwuwartościowa	Pdh	7,94 [kW]
		Tj=graniczna temperatura robocza	Pdh	8,78 [kW]

Zmierzony współczynnik efektywności przy temperaturze zewnętrznej Tj	Klimat umiarkowany - Zastosowanie w średniej temperaturze	Tj=-15°C	COPd	- [kW]
		Tj=-7°C	COPd	2,31 [kW]
		Tj=2°C	COPd	3,42 [kW]
		Tj=7°C	COPd	4,58 [kW]
		Tj=12°C	COPd	5,93 [kW]
		Tj=temperatura dwuwartościowa	COPd	2,31 [kW]
		Tj=graniczna temperatura robocza	COPd	2,03 [kW]

Temperatura dwuwartościowa	$T_{bivalent}$	-7 [°C]
Graniczna temperatura robocza	TOL	-10 [°C]
Temperatury	WTOL	- [°C]
Współczynnik strat	Cdh	0,98 [-]

Zużycie energii w trybach innych niż tryb aktywny	Tryb wyłączenia	P_{OFF}	0,010 [kW]
	Tryb wyłączenia termostatu	P_{TO}	0,019 [kW]
	Tryb czuwania	P_{SB}	0,010 [kW]
	Tryb włączonej grzałki karteru	P_{CK}	0,010 [kW]
Grzałka dodatkowa [1]	Znamionowa moc ogrzewania	P_{SUP}	0,22 [kW]
	Rodzaj zasilania		Elektryczne

Inne pozycje	Regulacja wydajności	Zmienna	
	Regulacja przepływu wody	Stała	
	Prędkość przepływu wody	-	
	Roczne zużycie energii	Q_{HE}	5291 [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).

Badania wykonane prze Rasmusa Thisgaarda, Duński Instytut Technologiczny.

Wyniki testów punktów testowych COP w niskiej temperaturze - EN 14511

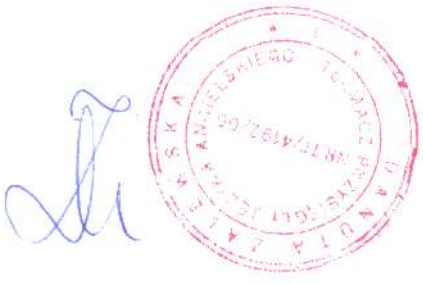
Nr	Warunki testowe	Moc grzewcza [kW]	COP
1	A7/W35	9.94	4.49
Badania wykonane prze Rasmusa Thisgaarda, Duński Instytut Technologiczny.			

Wyniki testów punktów testowych COP w średniej temperaturze - EN 14511

Nr	Warunki testowe	Moc grzewcza [kW]	COP
2	A7/W55	10,36	3,04
Badania wykonane prze Rasmusa Thisgaarda, Duński Instytut Technologiczny.			

Wyniki pomiarów mocy akustycznej - EN 12102

Nr	Warunki testowe	Poziom mocy akustycznej LW(A) [dB re 1pW]	Niepewność (dB) (wartość ważona)
1	A7W55	64,0	0,5
Badania wykonane prze Kamalathasana Aramugama, Duński Instytut Technologiczny.			



Szczegółowe wyniki pomiarów mocy akustycznej

logo: ilac-MRA DANAK
Nr rej badań300

Poziomy mocy akustycznej zgodnie z normą ISO 3743-1:2010

TEKNOLOGISK INSTITUT

Metoda techniczna dla małych, ruchomych źródeł w polach pogłosowych - Metoda porównawcza dla pomieszczeń pomiarowych o ścianach odbijających dźwięk

Klient:	Klima-Therm AB
Obiekt:	Typ: Pompa ciepła powietrze-woda, Model: KHY-12PY3
Warunki montażu:	Jednostka zewnętrzna jest zamontowana na metalowej ramie nośnej za pomocą czterech gumowych wibroizolatorów dostarczonych przez producenta. Rama nośna jest umieszczone na tacy ociekowej na dwóch ciężkich betonowych płytach (90x90x10cm) ułożonych na macie tłumiącej drgania na podłodze. Dźwięk emitowany przez jednostkę zewnętrzną został zmierzony w pomieszczeniu testowym nr 2.
Warunki pracy:	A7/W55, Prędkość sprężarki: 33[Hz], Prędkość wentylatora: nie dot[obr/min], Wydajność grzewcza: 5,5 [kW], Moc_wej: 1,87[kW], Przepływ wody: 1100 [l/h] i dP_wody: 800 [mbar]

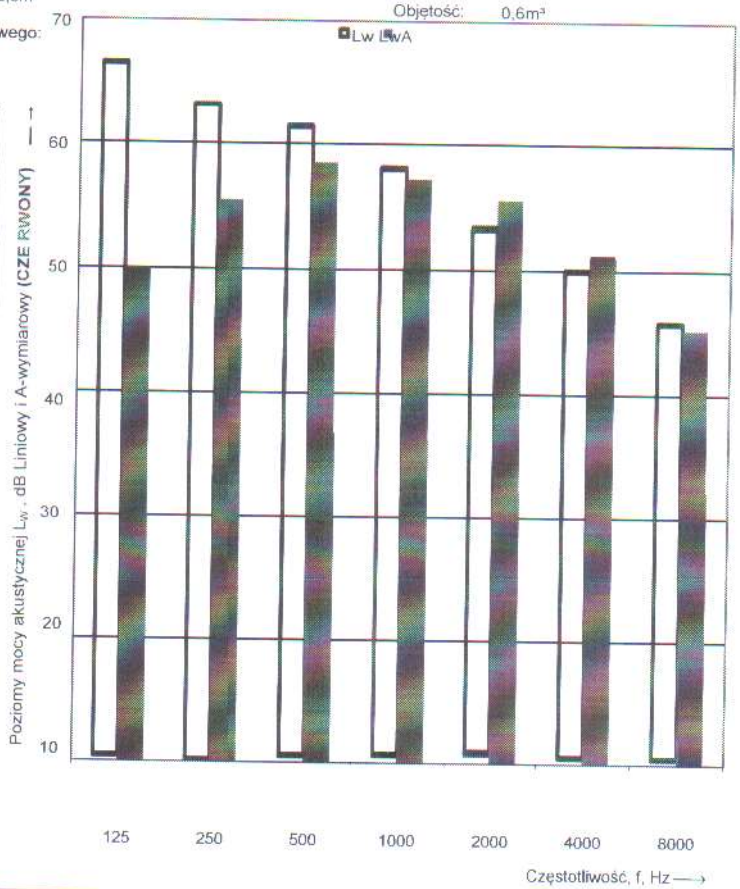
Data testu:12-04-2023

Ciśnienie statyczne: 1005 kPa
Temperatura powietrza: 7.0 °C
Względna wilgotność powietrza: 84.0 %
Objętość pomieszczenia testowego: 102,8m³
Powierzchnia, S, pomieszczenia testowego: 138.9 m²

Pomieszczenie: Pmieszczenie 2

Pole odniesienia:
L1: 1.3m
L2: 0,5 m
L3: 1,3 m
Objętość: 0,6m³

Częstotliwość f [Hz]	L_W 1/3 oktawy [dB]	1/1 okt [dB]
100	64,2	
125	61,0	66,7
160	59,1	
200	58,8	
250	61,2	
315	58,3	64.4
400	58,7	
500	56,9	62,0
630	55,7	
800	54,5	
1000	52,1	57.6
1250	51,0	
1600	50,0	
2000	49,3	53,7
2500	46,9	
3150	45,9	
4000	45,4	49.9
5000	43,8	
6300	42,7	
8000	40,7	45,9
10000	39,4	



1 Różnica w stosunku do szumów tła < 6dB

Poziom mocy akustycznej L_W(A): 64dB [re 1pW]

Nazwa instytutu badawczego: DTI
Nr raportu z badań: 300-KLAB-23-003
Data: 12-04-2023
Pomiary są w pełni zgodne z normą ISO 3743

Załącznik 1: Procedura testowa

Pomiary poziomu mocy akustycznej emitowanej przez pompę ciepła są przeprowadzane zgodnie z poniższymi normami:

- DS/EN 14511:2018
- EN 12102-1:2017
- ISO/EN 3743-1

Podstawową normą pomiarów akustycznych ISO/EN 3743-1 jest metoda porównawcza wykorzystująca skalibrowane referencyjne źródło dźwięku. Dwie serie pomiarów ciśnienia akustycznego są wykonywane w dokładnie takich samych warunkach akustycznych, np. w tych samych pozycjach mikrofonu, temperaturze i wilgotności powietrza. Skalibrowane poziomy mocy akustycznej są znane dla referencyjnego źródła dźwięku w każdym paśmie częstotliwości i są wykorzystywane do oszacowania współczynnika korekcji akustycznej do obliczenia mocy akustycznej emitowanej przez testowaną pompę ciepła. Poziomy hałasu tła są mierzone i wykorzystywane do odpowiednich korekt.

Ostateczny całkowity poziom mocy akustycznej skorygowany charakterystyką A jest oparty na pomiarach i obliczeniach w poziomach 1/3-oktawowych, które następnie są sumowane do poziomów 1/1-oktawowych. Niepewność jest szacowana na podstawie ważonych odchyleń standardowych na poziomach 1/1 oktawy.

Rzeczywiste pozycje mikrofonów i wartości korekcji są zapisywane w plikach danych połączonych z pełną dokumentacją projektu zgodnie z akredytacją DANAK.

Kompletny system pomiarowy jest udokumentowany i regularnie kalibrowany zgodnie z DANAK.

Szczegółowy opis metody pomiarowej jest podany w języku duńskim w systemie bazy danych jakości „QA Web" w Duńskim Instytucie Technologicznym, który jest dostępny przez DANAK.

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*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 10 stron *Gdańsk, 2/09/2024* *Rep.: 144/2024*