TEST REPORT

Report no.:
300-KLAB-23-042-23

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File no.: 226011
Enclosures: 2

Customer:	Company:	GD MIDEA HEATING & VENTILATING EQUIPMENT CO., LTD.
	Address:	Penglai Industry Road, Beijiao
	City:	Shunde, Foshan, Guangdong, 528311, China
	Tel.:	+86 13902810522
Component:	Brand:	Midea
	Type:	Air to water heat pump (mono block)
	Model:	MHC-V10W/D2N8-BER90
	Series no.:	341H27881012C060100005
	Prod. Year:	Outdoor unit: N/A
Dates:	Component tested: Marts - April 2024	
Brand name:	Brand:	Thermoval
	Type:	Air to water heat pump (mono block)
	Model:	TVHP-M10
Procedures	See objective (page 3) 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. Between each test condition, Midea has been changing various parameters like compressor speed, expansion valve, fan speed, pump speed, defrost time, heating time. The report for the tested unit is named 300-KLAB-23-042 issued 2024.04.17 Also see appendix 2.

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: 2024.09.05

Signature:
Kamalathasan Arumugam
B. Sc. Engineer

Co-reader:
Preben Eskerod
B.TecMan & MarEng

ilac-MRA DANAK
Test Reg. nr. 300

Heat pumps of identical design

According to GD MIDEA HEATING & VENTILATING EQUIPMENT CO. LTD., the heat pumps listed in the table below are considered identical with the tested unit. They have identical:

a. heating capacity
b. refrigerant cycle (incl. refrigerant mass)
c. heat source and sink medium
d. main components / operating principle and control strategy
e. same outdoor casing

Midea	MHC-V10W/D2N8-B
Midea	MHC-V10W/D2N8-BE30
Midea	MHC-V10W/D2N8-BER90
Midea	MHC-V10W/D2N8-B1
Midea	MHC-V10W/D2N8-B1E30
Midea	MHC-V10W/D2N8-B1ER90
Midea	MHC-V10W/D2N8-B2
Midea	MHC-V10W/D2N8-B2E30
Midea	MHC-V10W/D2N8-B2ER90

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 5 and 6.

SCOP part load test in condition $SCOP_B$ at low temperature application for warmer climate according to EN 14825:2022.

SCOP part load test conditions $SCOP_A$ and $SCOP_{F/G}$ at low temperature application for colder climate according to EN 14825:2022.

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

Operating requirements according to EN 14511-4:2022
- 4.2.1 Starting and operating tests
- 4.5 Shutting of the heat transfer medium flows
- 4.6 Complete power supply failure

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	Variable
Warmer	2	7	2	Variable	Variable
Colder	-22	-15	-22	Variable	Variable

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	Variable

COP test conditions - low temperature – EN 14511

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

S: Standard rating condition

COP test conditions - medium temperature – EN 14511

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

S: Standard rating condition

Test conditions for operating requirements – EN 14511-4

N#	Heat source		Heat sink	Water flow rate at indoor heat exchanger	Test
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)		
1	-25	-	12	500 L/h	Starting
2	-25	-	38	500 L/h	Operating

Test conditions for shutting off the heat transfer medium – EN 14511-4

N#	Heat source		Heat sink		Heat exchanger
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1	7	6	30	35	Indoor
2	7	6	30	35	Outdoor

Test conditions for complete power supply failure – EN 14511-4

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

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[E]	7/6	47/55	37	400	3.95	1.43

E) ErP labelling

Test results

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

Model (Outdoor)	MHC-V10W/D2N8-BER90
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	N
Heat pump combination heater	N
Reversible	Y

Rated heat output[1)]	P_{rated}	**9.2** [kW]
Seasonal space heating energy efficiency	η_s	**202.0** [%]
	SCOP	**5.12** [-]

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	7.89 [kW]
		Tj=2 °C	Pdh	4.98 [kW]
		Tj=7 °C	Pdh	4.16 [kW]
		Tj=12 °C	Pdh	4.77 [kW]
		Tj=bivalent temperature	Pdh	7.89 [kW]
		Tj=operation limit	Pdh	7.42 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Low temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	3.09 [-]
		Tj=2 °C	COPd	5.02 [-]
		Tj=7 °C	COPd	7.02 [-]
		Tj=12 °C	COPd	8.90 [-]
		Tj=bivalent temperature	COPd	3.09 [-]
		Tj=operation limit	COPd	2.87 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit	TOL	-10 [°C]
temperatures	WTOL	- [°C]
Degradation coefficient	Cdh	0.97 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.012 [kW]
	Thermostat-off mode	P_{TO}	0.017 [kW]
	Standby mode	P_{SB}	0.012 [kW]
	Crankcase heater mode	P_{CK}	0.012 [kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	1.78 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q_{HE}	3709 [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)	MHC-V10W/D2N8-BER90
Air-to-water heat pump mono bloc	Y
Low-temperature heat pump	N
Equipped with supplementary heater	N
Heat pump combination heater	N
Reversible	Y

Rated heat output[1)]	P_{rated}	**7.7**	[kW]
Seasonal space heating energy efficiency	η_s	**144.6**	[%]
	SCOP	**3.69**	[-]

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	7.04	[kW]
		Tj=2 °C	Pdh	4.58	[kW]
		Tj=7 °C	Pdh	3.92	[kW]
		Tj=12 °C	Pdh	4.62	[kW]
		Tj=bivalent temperature	Pdh	7.04	[kW]
		Tj=operation limit	Pdh	6.11	[kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Medium temperature application	Tj=-15 °C	COPd	-	[-]
		Tj=-7 °C	COPd	2.23	[-]
		Tj=2 °C	COPd	3.65	[-]
		Tj=7 °C	COPd	4.88	[-]
		Tj=12 °C	COPd	6.51	[-]
		Tj=bivalent temperature	COPd	2.23	[-]
		Tj=operation limit	COPd	1.85	[-]

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}	0.012	[kW]
	Thermostat-off mode	P_{TO}	0.017	[kW]
	Standby mode	P_{SB}	0.012	[kW]
	Crankcase heater mode	P_{CK}	0.012	[kW]
Supplementary heater[1)]	Rated heat output	P_{SUP}	1.59	[kW]
	Type of energy input		Electrical	

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q_{HE}	4310 [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 for warmer climate, low temperature according to EN14825

N°	Test condition	Heating capacity [kW]	COP
1	B	8.315	3.753

Test results for colder climate, low temperature according to EN14825

N°	Test condition	Heating capacity [kW]	COP
1	A	4.876	3.842
2	F&G	6.516	2.673

COP test results - low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W35	9.900	4.815

COP test results - medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W55	9.080	2.958

Test results for starting and operating test - EN 14511-4

N#	Test conditions air/water inlet [°C]	Test validation
Starting	A-25/W12	Passed
Operating	A-25/W38	Passed

Test results for shutting off the heat transfer medium – EN 14511-4

N#	Heat exchanger	Test validation
1	Indoor	Passed
2	Outdoor	Passed

Test results for complete power supply failure – EN 14511-4

N#	Test validation
1	Passed

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	56.4	1.7

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

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	8.14	7.89	3.09	0.99	1.00	3.09
B	2	54	4.95	4.98	5.02	0.98	1.00	5.02
C	7	35	3.18	4.16	7.02	0.97	0.76	6.96
D	12	15	1.42	4.77	8.90	0.97	0.30	8.27
E	-10	100	9.20	7.42	2.87	0.99	1.00	2.87
F - BIV	-7	88	8.14	7.89	3.09	0.99	1.00	3.09

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	0.012	0.012	0
Thermostat off	178	0.017	0.017	3.026
Standby	0	0.012	0.012	0
Crankcase heater	178	0.012	0	0

Calculation Bin for SCOPon

	Bin [-]	Outdoor temperature [°C]	Hours [h]	Heat load [kW]	Heat load covered by heat pump [kW]	Electrical back up heater [kW]	Annual backup heater energy input [kWh]	COPbin [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
E	21	-10	1	9.20	7.42	1.78	1.78	2.87	9.20	4.37	7.42	2.59
	22	-9	25	8.85	7.58	1.27	31.67	2.94	221.15	96.07	189.48	64.40
	23	-8	23	8.49	7.73	0.76	17.42	3.02	195.32	76.37	177.90	58.95
A / F - BIV	24	-7	24	8.14	7.89	0.00	0.00	3.09	195.32	63.14	195.32	63.14
	25	-6	27	7.78	7.56	0.00	0.00	3.31	210.18	63.56	210.18	63.56
	26	-5	68	7.43	7.24	0.00	0.00	3.52	505.29	143.52	505.29	143.52
	27	-4	91	7.08	6.91	0.00	0.00	3.73	644.00	172.46	644.00	172.46
	28	-3	89	6.72	6.59	0.00	0.00	3.95	598.35	151.57	598.35	151.57
	29	-2	165	6.37	6.26	0.00	0.00	4.16	1050.92	252.56	1050.92	252.56
	30	-1	173	6.02	5.93	0.00	0.00	4.37	1040.66	237.89	1040.66	237.89
	31	0	240	5.66	5.61	0.00	0.00	4.59	1358.77	296.15	1358.77	296.15
	32	1	280	5.31	5.28	0.00	0.00	4.80	1486.15	309.51	1486.15	309.51
B	33	2	320	4.95	4.95	0.00	0.00	5.02	1585.23	316.09	1585.23	316.09
	34	3	357	4.60	4.60	0.00	0.00	5.40	1642.20	303.88	1642.20	303.88
	35	4	356	4.25	4.25	0.00	0.00	5.79	1511.63	260.94	1511.63	260.94
	36	5	303	3.89	3.89	0.00	0.00	6.18	1179.37	190.77	1179.37	190.77
	37	6	330	3.54	3.54	0.00	0.00	6.57	1167.69	177.70	1167.69	177.70
C	38	7	326	3.18	3.18	0.00	0.00	6.96	1038.18	149.16	1038.18	149.16
	39	8	348	2.83	2.83	0.00	0.00	7.22	985.11	136.39	985.11	136.39
	40	9	335	2.48	2.48	0.00	0.00	7.49	829.77	110.85	829.77	110.85
	41	10	315	2.12	2.12	0.00	0.00	7.75	668.77	86.31	668.77	86.31
	42	11	215	1.77	1.77	0.00	0.00	8.01	380.38	47.48	380.38	47.48
D	43	12	169	1.42	1.42	0.00	0.00	8.27	239.20	28.91	239.20	28.91
	44	13	151	1.06	1.06	0.00	0.00	8.54	160.29	18.78	160.29	18.78
	45	14	105	0.71	0.71	0.00	0.00	8.80	74.31	8.44	74.31	8.44
	46	15	74	0.35	0.35	0.00	0.00	9.06	26.18	2.89	26.18	2.89

SUM	19003.66	3705.77	18952.79	3654.90
SCOPon		5.13	**SCOPnet**	5.19

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	6.81	7.04	2.23	0.99	1.00	2.23
B	2	54	4.15	4.58	3.65	0.99	1.00	3.65
C	7	35	2.67	3.92	4.88	0.98	0.68	4.83
D	12	15	1.18	4.62	6.51	0.98	0.26	6.08
E	-10	100	7.70	6.11	1.85	0.99	1.00	1.85
F - BIV	-7	88	6.81	7.04	2.23	0.99	1.00	2.23

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	0.012	0.012	0
Thermostat off	178	0.017	0.017	3.026
Standby	0	0.012	0.012	0
Crankcase heater	178	0.012	0	0

Calculation Bin for SCOPon

	Bin [-]	Outdoor temperature [°C]	Hours [h]	Heat load [kW]	Heat load covered by heat pump [kW]	Electrical back up heater [kW]	Annual backup heater energy input [kWh]	COPbin [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
E	21	-10	1	7.70	6.11	1.59	1.59	1.85	7.70	4.89	6.11	3.29
	22	-9	25	7.40	6.34	1.06	26.58	1.98	185.10	106.69	158.51	80.11
	23	-8	23	7.11	6.58	0.53	12.23	2.10	163.48	84.17	151.25	71.94
A / F - BIV	24	-7	24	6.81	6.81	0.00	0.00	2.23	163.48	73.43	163.48	73.43
	25	-6	27	6.52	6.52	0.00	0.00	2.38	175.92	73.79	175.92	73.79
	26	-5	68	6.22	6.22	0.00	0.00	2.54	422.91	166.38	422.91	166.38
	27	-4	91	5.92	5.92	0.00	0.00	2.70	539.00	199.66	539.00	199.66
	28	-3	89	5.63	5.63	0.00	0.00	2.86	500.80	175.26	500.80	175.26
	29	-2	165	5.33	5.33	0.00	0.00	3.02	879.58	291.70	879.58	291.70
	30	-1	173	5.03	5.03	0.00	0.00	3.17	870.99	274.49	870.99	274.49
	31	0	240	4.74	4.74	0.00	0.00	3.33	1137.23	341.41	1137.23	341.41
	32	1	280	4.44	4.44	0.00	0.00	3.49	1243.85	356.52	1243.85	356.52
B	33	2	320	4.15	4.15	0.00	0.00	3.65	1326.77	363.83	1326.77	363.83
	34	3	357	3.85	3.85	0.00	0.00	3.88	1374.45	353.87	1374.45	353.87
	35	4	356	3.55	3.55	0.00	0.00	4.12	1265.17	306.97	1265.17	306.97
	36	5	303	3.26	3.26	0.00	0.00	4.36	987.08	226.46	987.08	226.46
	37	6	330	2.96	2.96	0.00	0.00	4.60	977.31	212.64	977.31	212.64
C	38	7	326	2.67	2.67	0.00	0.00	4.83	868.92	179.77	868.92	179.77
	39	8	348	2.37	2.37	0.00	0.00	5.08	824.49	162.19	824.49	162.19
	40	9	335	2.07	2.07	0.00	0.00	5.33	694.48	130.21	694.48	130.21
	41	10	315	1.78	1.78	0.00	0.00	5.58	559.73	100.25	559.73	100.25
	42	11	215	1.48	1.48	0.00	0.00	5.83	318.37	54.58	318.37	54.58
D	43	12	169	1.18	1.18	0.00	0.00	6.08	200.20	32.91	200.20	32.91
	44	13	151	0.89	0.89	0.00	0.00	6.33	134.16	21.18	134.16	21.18
	45	14	105	0.59	0.59	0.00	0.00	6.58	62.19	9.45	62.19	9.45
	46	15	74	0.30	0.30	0.00	0.00	6.83	21.92	3.21	21.92	3.21

SUM	15905.24	4305.89	15864.83	4265.49
SCOPon		3.69	**SCOPnet**	3.72

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	9.2
Heating demand:	kW	8.14
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	**7.890**
COP	-	**3.094**
Power consumption	kW	**2.551**
Measured		
Heating capacity	kW	7.902
COP	-	3.084
Power consumption	kW	2.562
During heating		
Air_inlet temperature dry bulb	°C	-6.85
Air temperature wet bulb	°C	-7.86
Air_outlet temperature dry bulb	°C	1.01
Water_inlet temperature	°C	28.99
water_outlet temperature	°C	33.74
Water_outlet temperature (Time averaged)	°C	**33.74**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	4533
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	12
Calculated Power correction	W	13
Water Flow	m^3/s	0.000400

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	9.2
Heating demand:	kW	4.95
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.981**
COP	-	**5.015**
Power consumption	kW	**0.993**
Measured		
Heating capacity	kW	4.991
COP	-	4.945
Power consumption	kW	1.009
During heating		
Air_inlet temperature dry bulb	°C	2.08
Air temperature wet bulb	°C	1.00
Water_inlet temperature	°C	25.04
water_outlet temperature	°C	30.04
Water_outlet temperature (Time averaged)	°C	**30.04**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	5979
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.13
Calculated Capacity correction	W	10
Calculated Power correction	W	12
Water Flow	m^3/s	0.000258

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	9.2
Heating demand:	kW	3.18
CR:	-	0.8
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	**4.164**
COP	-	**7.021**
Power consumption	kW	**0.593**
Measured		
Heating capacity	kW	4.169
COP	-	6.965
Power consumption	kW	0.599
During heating		
Air_inlet temperature dry bulb	°C	6.97
Air temperature wet bulb	°C	5.94
Water_inlet temperature	°C	23.22
water_outlet temperature	°C	28.22
Water_outlet temperature (Time averaged)	°C	**27.04**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	3870
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	6
Calculated Power correction	W	6
Water Flow	m^3/s	0.000200

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	9.2
Heating demand:	kW	1.42
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	**4.767**
COP	-	**8.895**
Power consumption	kW	**0.536**
Measured		
Heating capacity	kW	4.778
COP	-	8.676
Power consumption	kW	0.551
During heating		
Air_inlet temperature dry bulb	°C	12.01
Air temperature wet bulb	°C	10.90
Water_inlet temperature	°C	22.46
water_outlet temperature	°C	27.49
Water_outlet temperature (Time averaged)	°C	**23.95**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	7035
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.13
Calculated Capacity correction	W	10
Calculated Power correction	W	12
Water Flow	m^3/s	0.000228

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	9.2
Heating demand:	kW	9.20
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	**7.424**
COP	-	**2.867**
Power consumption	kW	**2.590**
Measured		
Heating capacity	kW	7.435
COP	-	2.849
Power consumption	kW	2.610
During heating		
Air_inlet temperature dry bulb	°C	-10.01
Air temperature wet bulb	°C	-11.00
Water_inlet temperature	°C	30.01
water_outlet temperature	°C	35.05
Water_outlet temperature (Time averaged)	°C	**35.05**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	4916
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.13
Calculated Capacity correction	W	11
Calculated Power correction	W	13
Water Flow	m^3/s	0.000355

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	7.70
Heating demand:	kW	6.81
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	**7.043**
COP	-	**2.226**
Power consumption	kW	**3.164**
Measured		
Heating capacity	kW	7.046
COP	-	2.222
Power consumption	kW	3.171
During heating		
Air_inlet temperature dry bulb	°C	-6.90
Air temperature wet bulb	°C	-7.95
Water_inlet temperature	°C	44.01
water_outlet temperature	°C	52.14
Water_outlet temperature (Time averaged)	°C	**52.14**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	2415
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	4
Calculated Power correction	W	4
Water Flow	m^3/s	0.000210

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	7.70
Heating demand:	kW	4.15
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	**4.578**
COP	-	**3.647**
Power consumption	kW	**1.255**
Measured		
Heating capacity	kW	4.581
COP	-	3.647
Power consumption	kW	1.256
During heating		
Air_inlet temperature dry bulb	°C	2.04
Air temperature wet bulb	°C	1.04
Water_inlet temperature	°C	34.05
water_outlet temperature	°C	42.22
Water_outlet temperature (Time averaged)	°C	**42.22**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	2800
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	3
Calculated Power correction	W	3
Water Flow	m^3/s	0.000135

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	7.70
Heating demand:	kW	2.67
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	**3.919**
COP	-	**4.882**
Power consumption	kW	**0.803**
Measured		
Heating capacity	kW	3.924
COP	-	4.859
Power consumption	kW	0.808
During heating		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.00
Water_inlet temperature	°C	30.36
water_outlet temperature	°C	38.49
Water_outlet temperature (Time averaged)	°C	**35.89**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	6635
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	6
Calculated Power correction	W	6
Water Flow	m^3/s	0.000116

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	7.70
Heating demand:	kW	1.18
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	**4.618**
COP	-	**6.506**
Power consumption	kW	**0.710**
Measured		
Heating capacity	kW	4.626
COP	-	6.481
Power consumption	kW	0.714
During heating		
Air_inlet temperature dry bulb	°C	11.98
Air temperature wet bulb	°C	11.00
Water_inlet temperature	°C	27.94
water_outlet temperature	°C	35.98
Water_outlet temperature (Time averaged)	°C	**30.00**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	8612
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.13
Calculated Capacity correction	W	8
Calculated Power correction	W	9
Water Flow	m^3/s	0.000139

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	7.70
Heating demand:	kW	7.70
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	**6.105**
COP	-	**1.855**
Power consumption	kW	**3.291**
Measured		
Heating capacity	kW	6.109
COP	-	1.853
Power consumption	kW	3.296
During heating		
Air_inlet temperature dry bulb	°C	-9.91
Air temperature wet bulb	°C	-10.83
Water_inlet temperature	°C	47.00
water_outlet temperature	°C	54.95
Water_outlet temperature (Time averaged)	°C	**54.95**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	3182
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	4
Calculated Power correction	W	5
Water Flow	m^3/s	0.000186

Detailed SCOP part load test results - low temperature application - warmer climate – EN 1482

Detailed result for 'EN14825:2022' Warmer Low (B) A 2 /W35		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Warmer
Temperature application:		Low
Condition name:		B
Condition temperature:	°C	2
Part load:	%	100%
Chosen Tbivalent	°C	-7
Tdesign	°C	2
Pdesign	kW	8.60
Heating demand:	kW	8.60
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positve ext. static pressure difference:		Yes
Included corrections (Final result)		
Heating capacity	kW	**8.315**
COP	-	**3.753**
Power consumption	kW	**2.215**
Measured		
Heating capacity	kW	8.329
COP	-	3.728
Power consumption	kW	2.234
During heating		
Air_inlet temperature dry bulb	°C	2.00
Air temperature wet bulb	°C	1.00
Air_outlet temperature dry bulb	°C	1.02
Water_inlet temperature	°C	30.07
water_outlet temperature	°C	35.04
Water_outlet temperature (Time averaged)	°C	**35.04**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	5521
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	15
Calculated Power correction	W	17
Water Flow	m^3/s	0.000441

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

Detailed result for 'EN14825:2022' Colder Low (A) A -7 /W30		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Colder
Temperature application:		Low
Condition name:		A
Condition temperature:	°C	-7
Part load:	%	61%
Chosen Tbivalent	°C	-15
Tdesign	°C	-22
Pdesign	kW	7.70
Heating demand:	kW	4.66
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	**4.876**
COP	-	**3.842**
Power consumption	kW	**1.269**
Measured		
Heating capacity	kW	4.882
COP	-	3.822
Power consumption	kW	1.278
During heating		
Air_inlet temperature dry bulb	°C	-7.00
Air temperature wet bulb	°C	-7.99
Water_inlet temperature	°C	25.00
water_outlet temperature	°C	29.97
Water_outlet temperature (Time averaged)	°C	**29.97**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	3411
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	6
Calculated Power correction	W	7
Water Flow	m^3/s	0.000236

Detailed result for 'EN14825:2022' Colder Low (F and G) A -15 /W32		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Colder
Temperature application:		Low
Condition name:		F and G
Condition temperature:	°C	-15
Part load:	%	82%
Chosen Tbivalent	°C	-15
Tdesign	°C	-22
Pdesign	kW	7.70
Heating demand:	kW	6.28
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	**6.516**
COP	-	**2.673**
Power consumption	kW	**2.437**
Measured		
Heating capacity	kW	6.518
COP	-	2.673
Power consumption	kW	2.439
During heating		
Air_inlet temperature dry bulb	°C	-15.01
Air temperature wet bulb	°C	-
Water_inlet temperature	°C	27.01
water_outlet temperature	°C	32.16
Water_outlet temperature (Time averaged)	°C	**32.16**
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	1087
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	3
Calculated Power correction	W	3
Water Flow	m^3/s	0.000304

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	**9.900**
COP	-	**4.815**
Power consumption	kW	**2.056**
Measured		
Heating capacity	kW	9.907
COP	-	4.800
Power consumption	kW	2.064
During heating		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.00
Water_inlet temperature	°C	29.94
water_outlet temperature	°C	34.93
Water_outlet temperature (Time averaged)		
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	1996
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	7
Calculated Power correction	W	8
Water Flow	m^3/s	0.000478

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	**9.080**
COP	-	**2.958**
Power consumption	kW	**3.070**
Measured		
Heating capacity	kW	9.089
COP	-	2.951
Power consumption	kW	3.080
During heating		
Air_inlet temperature dry bulb	°C	6.99
Air temperature wet bulb	°C	5.99
Water_inlet temperature	°C	47.01
water_outlet temperature	°C	54.99
Water_outlet temperature (Time averaged)		
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	4824
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.13
Calculated Capacity correction	W	9
Calculated Power correction	W	10
Water Flow	m^3/s	0.000276

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

Sound power levels according to ISO 3743-1:2010

TEKNOLOGISK INSTITUT

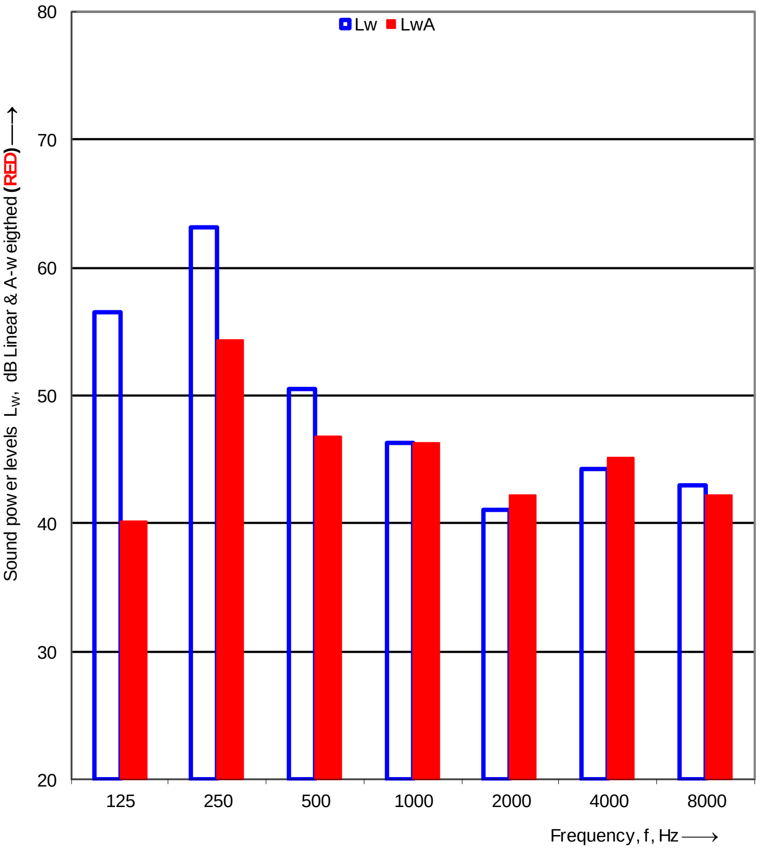
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms

Client:	Midea	Date of test:	19-03-2024
Object:	Type: Mono air to water heat pump, Model: MHC-V10W/D2N8-BER90		
Mounting conditions:	The outdoor unit is mounted on the supporting metal support frame using six pieces of spring mounts vibration isolators and placed on four pieces of concrete tiles (20x20x2.5 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 2.		
Operating conditions:	A7/W55, Compressor speed: 37[Hz], Fan speed: 400[rpm], Pump speed: 35[%], EXV1: 80[%], Heating capacity: 3.95 [kW], Power_input: 1.43 [kW], Water flow rate: 430 [l/h] and dP_water: 70 [mbar]		

Static pressure:	1018 hPa			Reference box:	
Air temperature:	7.0 °C			L1:	1.4 m
Relative air humidity:	84.0 %			L2:	0.4 m
Test room volume:	102.8 m³	Room:	Room 2	L3:	0.9 m
Area, S, of test room:	138.9 m²			Volume:	0.5 m³

Frequency f [Hz]	L_W 1/3 octave [dB]	1/1 oct [dB]
100	54.1 [1]	
125	47.8 [2]	56.5 [2]
160	51.0 [2]	
200	60.2	
250	56.7	63.1
315	57.4	
400	47.8	
500	44.8	50.5
630	43.2	
800	41.5	
1000	40.7	46.2
1250	42.1	
1600	37.0	
2000	35.8	41.1
2500	36.0	
3150	40.8	
4000	37.3	44.2
5000	39.6	
6300	40.1	
8000	37.2	42.9
10000	36.1	

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



Sound power level L_W(A): **56.4 dB [re 1pW]** **Uncertainty σtot: 1.7 dB**

Name of test institute:	DTI	Date:	19-03-2024
No. of test report:	300-KLAB-23-042		

Measurements are in full conformity with ISO 3743-1

Appendix 1 Sound power measurement

Unit specification

Type of unit: Mono air to water heat pump
Manufacturer: Midea
Size of the heat pump: 0.4 x 1.4 x 0.9 m (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 acoustical test chamber fulfils the requirements of ISO3743-1 accuracy grade 2 (engineering grade).

The 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	Nor0sonic 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 standard:

- 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 acoustical 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. 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: σ_{tot}: $\sqrt{1.5^2 + 0.7^2} = 1.7\ dB$ and $U(95\%) = 3.4\ dB$

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.

Appendix 2 Authorization Letter

美的 Midea

Authorization Letter

This declaration of conformity is issued under the sole responsibility of

Manufacturer's Name: GD Midea HEATING&VENTILATING Equipment Co.,Ltd.
Manufacturer's Address: Midea Industrial City, Shunde, Foshan, Guangdong, P.R. China

We declare that the following Heat Pump product we produced for AB KLIMA
are identical to our following models

Master company(Midea) model	Thermoval Model
MHC-V8W/D2N8-B	TVHP-M08
MHC-V10W/D2N8-B	TVHP-M10
MHC-V14W/D2N8-B	TVHP-M14
MHC-V16W/D2N8-B	TVHP-M16
MHC-V12W/D2RN8-B	TVHP-M12
/	/

Company name: AB KLIMA

Tradename /-mark: Thermoval

Address: 36-007 Krasne 25 C, k/ Rzeszowa, Poland.

Note: This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer's consent.

Production year: 2021~2023

Date: **2024/8/1**

Authorization: Shirley

Małgorzata Godlewska
Tłumacz przysięgły języka angielskiego / Sworn translator of English
ul. Lanciego 19/33 02-792 Warszawa; Tel. 504-413-269
e-mail: malgorzata.godlewska@legalingua.pl

TŁUMACZENIE POŚWIADCZONE Z JĘZYKA ANGIELSKIEGO

[*uwagi tłumacza pisane kursywą w nawiasach kwadratowych*]-/-

RAPORT Z TESTU-/-

Nr raportu: 300-KLAB-23-042-23-/-

[*logo*] **DUŃSKI INSTYTUT TECHNOLOGICZNY**-/-

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

Init: KAMA/PRES/AAS-/-
Nr akt: 226011-/-
Załączniki: 2-/-

Klient:
Spółka: GD MIDEA HEATING & VENTILATING EQUIPMENT CO., LTD.-/-
Adres: Penglai Industry Road, Beijiao-/-
Miasto: Shunde, Foshan, Guangdong, 528311, Chiny-/-
Tel: +86 13902810522-/-

Komponent:
Marka: Midea-/-
Rodzaj: Pompa ciepła powietrze-woda (monoblok) -/-
Model: MHC-V10W/D2N8-BER90-/-
Nr serii: 341H27881012C060100005-/-
Rok produkcji: Jednostka zewnętrzna: nie dotyczy-/-

Daty:
Testowany komponent: Marts [*prawdopodobnie błąd, powinno być: March - marzec*] - kwiecień 2024-/-

Nazwa marki:
Marka: Thermoval-/-
Rodzaj: Pompa ciepła powietrze-woda (monoblok) -/-
Model: TVHP-M10-/-

Procedury
Patrz cel (strona 3), gdzie wykazano standardy. -/-

Uwagi:
Jednostka została dostarczona przez klienta. Instalacja i ustawienia testowe zostały wykonane zgodnie z instrukcjami producenta. Pomiędzy każdym warunkiem testowym Midea zmieniała różne parametry, takie jak prędkość sprężarki, zawór rozprężny, prędkość wentylatora, prędkość pompy, czas odszraniania, czas grzania. Raport dla testowanej jednostki nosi nazwę 300-KLAB-23-042 wydany 2024.04.17 Zobacz także załącznik 2. -/-

Warunki:
Test ten został przeprowadzony na podstawie akredytacji zgodnie z międzynarodowymi wymogami (ISO/IEC 17025: 2017) i zgodnie z Ogólnymi Warunkami Duńskiego Instytutu Technologicznego. Wyniki testu dotyczą wyłącznie testowanego przedmiotu. Niniejszy raport z testu może być cytowany w formie wyciągu tylko za pisemną zgodą Duńskiego Instytutu Technologicznego. -/-

Klient nie może wspominać ani powoływać się na Duński Instytut Technologiczny lub pracowników Duńskiego Instytutu Technologicznego w celach reklamowych lub marketingowych, chyba że Duński Instytut Technologiczny udzieli pisemnej zgody w każdym takim przypadku. -/-

Oddział/Ośrodek:
Duński Instytut Technologiczny
Energia i Klimat-/-
Laboratorium Pomp Ciepła, Aarhus-/-
Data: 2024.09.05-/-

Podpis: -/-
Kamalathasan Arumugam-/-
B. Sc. Engineer-/-

Osoba sprawdzająca: -/-
Preben Eskerod-/-
B.TecMan & MarEng-/-

DANAK-/-
Rejestr testów nr 300-/-

Cel-/-

Celem niniejszego raportu jest udokumentowanie następujących kwestii:-/-

Sezonowy współczynnik wydajności (SCOP) przy zastosowaniu nisko- i średniotemperaturowym dla klimatu umiarkowanego zgodnie z normą EN 14825:2022.-/-

Aby obliczyć SCOP, przeprowadzono testy przy warunkach obciążenia częściowego określonych w tabelach na stronie 5 i 6.-/-

Test obciążenia częściowego SCOP w warunkach $SCOP_B$ przy zastosowaniu w niskotemperaturowym dla klimatu cieplejszego zgodnie z normą EN 14825:2022.-/-

Warunki $SCOP_A$ i $SCOP_{F/G}$ testu obciążenia częściowego SCOP przy zastosowaniu niskotemperaturowym dla klimatu chłodniejszego zgodnie z normą EN 14825:2022.-/-

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

Wymagania eksploatacyjne zgodnie z normą EN 14511-4:2022.-/-

4.2.1 Testy rozruchowe i eksploatacyjne-/-

4.5 Zamykanie przepływów nośnika ciepła-/-

4.6 Całkowita awaria zasilania-/-

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

ilac-MRA

DANAK-/-
Rejestr testów nr 300-/-

Wyniki testu-/-

Wyniki testu SCOP w niskiej temperaturze – średnia sezonu grzewczego – EN 14825-/-

Model (jednostka zewnętrzna)	MHC-V10W/D2N8-BER90
Pompa ciepła powietrze-woda monoblok	T
Pompa ciepła niskotemperaturowa	N
Wyposażona w dodatkowe ogrzewanie	N
Zbiornik kombinowany do pomp ciepła	N
Rewersyjna pompa ciepła	T

Znamionowa moc cieplna[1)]	P_{rated}	**9.2** [Kw]
Sezonowa efektywność ogrzewania pomieszczeń	ηs	**202.0** [%]
	SCOP	**5.12** [-]

Zmierzona wydajność grzewcza przy częściowym obciążeniu przy temperaturze zewnętrznej Tj	Klimat przeciętny - Zastosowanie niskotemperaturowe	Tj=-15 °C	Pdh	- [Kw]
		Tj=-7 °C	Pdh	7.89 [kW]
		Tj=2 °C	Pdh	4.98 [kW]
		Tj=7 °C	Pdh	4.16 [kW]
		Tj=12 °C	Pdh	4.77 [kW]
		Tj= temperatura dwuwartościowa	Pdh	7.89 [kW]
		Tj= ograniczenie operacyjne	Pdh	7.42 [kW]

Zmierzony współczynnik wydajności przy temperaturze zewnętrznej Tj	Klimat przeciętny - Zastosowanie niskotemperaturowe	Tj=-15 °C	COPd	-[-]
		Tj=-7 °C	COPd	3.09 [-]
		Tj=2 °C	COPd	5.02 [-]
		Tj=7 °C	COPd	7.02 [-]
		Tj=12 °C	COPd	8.90 [-]
		Tj= temperatura dwuwartościowa	COPd	3.09 [-]
		Tj= ograniczenie operacyjne	COPd	2.87 [-]

Temperatura dwuwartościowa	Tbivalent	-7 [° C]
Ograniczenie operacyjne	TOL	-10 [° C]
temperatury	WTOL	- [° C]
Współczynnik degradacji	Cdh	0.97 [° C]

Pobór mocy w trybach innych niż tryb aktywny	Tryb wyłączony	P_{OFF}	0.012 [kW]
	Tryb wyłączonego termostatu	P_{TO}	0.017 [kW]
	Tryb czuwania	P_{SB}	0.012 [kW]
	Tryb grzałki karteru	P_{CK}	0.012[kW]
Ogrzewanie dodatkowe [1)]	Znamionowa moc cieplna	P_{SUP}	1.78[kW]
	Rodzaj zasilania		Elektryczne

Inne	Kontrola wydajności		Zmienna
	Kontrola przepływu wody		Zmienna
	Natężenie przepływu wody		
	Roczne zużycie energii	Q_{HE}	3709 [kWh]

[1]) W przypadku ogrzewaczy pomieszczeń z pompą ciepła i zbiorników kombinowany do pomp ciepła, znamionowa moc cieplna, P_{rated}, jest równa projektowemu obciążeniu grzewczemu, $P_{designh}$, a znamionowa moc cieplna dodatkowego ogrzewacza P_{sup} jest równa dodatkowej mocy grzewczej sup(Tj).
[2]) Do obliczenia wartości SCOP używana jest wartość PACK -PCB. Zobacz sekcję „SCOP - szczegółowe obliczenia"

DANAK-/-
Rejestr testów nr 300-/-

[strona 4 oryginału]-/-

Wyniki testu SCOP w średniej temperaturze – średnia sezonu grzewczego – EN 14825-/-

Model (jednostka zewnętrzna)	MHC-V10W/D2N8-BER90
Pompa ciepła powietrze-woda monoblok	T
Pompa ciepła niskotemperaturowa	N
Wyposażony w dodatkowe ogrzewanie	N
Zbiornik kombinowany do pomp ciepła	N
Rewersyjna pompa ciepła	T

Znamionowa moc cieplna[1])	P_{rated}	**7.7** [Kw]
Sezonowa efektywność ogrzewania pomieszczeń	ηs	**144.6** [%]
	SCOP	**3.69** [-]

Zmierzona wydajność grzewcza przy częściowym obciążeniu przy temperaturze zewnętrznej Tj	Klimat przeciętny - Zastosowanie średniotemperaturowe	Tj=-15 °C	Pdh	- [Kw]
		Tj=-7 °C	Pdh	7.04 [kW]
		Tj=2 °C	Pdh	4.58 [kW]
		Tj=7 °C	Pdh	3.92 [kW]
		Tj=12 °C	Pdh	4.62 [kW]
		Tj= temperatura dwuwartościowa	Pdh	7.04 [kW]
		Tj= ograniczenie operacyjne	Pdh	6.11 [kW]

Zmierzony współczynnik wydajności przy temperaturze zewnętrznej Tj	Klimat przeciętny - Zastosowanie średniotemperaturowe	Tj=-15 °C	COPd	-[-]
		Tj=-7 °C	COPd	2.23 [-]
		Tj=2 °C	COPd	3.65 [-]
		Tj=7 °C	COPd	4.88 [-]
		Tj=12 °C	COPd	6.51 [-]
		Tj= temperatura dwuwartościowa	COPd	2.23 [-]
		Tj= ograniczenie operacyjne	COPd	1.85 [-]

Temperatura dwuwartościowa	Tbivalent	-7 [° C]
Ograniczenie operacyjne	TOL	-10 [° C]
temperatury	WTOL	- [° C]
Współczynnik degradacji	Cdh	0.98 [° C]

Pobór mocy w trybach innych niż tryb aktywny	Tryb wyłączony	P_{OFF}	0.012 [kW]
	Tryb wyłączonego termostatu	P_{TO}	0.017 [kW]
	Tryb czuwania	P_{SB}	0.012 [kW]
	Tryb grzałki karteru	P_{CK}	0.012 [kW]
Ogrzewanie dodatkowe [1])	Znamionowa moc cieplna	P_{SUP}	1.59 [kW]
	Rodzaj zasilania		Elektryczne

Inne	Kontrola wydajności		Zmienna
	Kontrola przepływu wody		Zmienna
	Natężenie przepływu wody		-
	Roczne zużycie energii	Q_{HE}	4310 [kWh]
[1] W przypadku ogrzewaczy pomieszczeń z pompą ciepła i zbiorników kombinowany do pomp ciepła, znamionowa moc cieplna, P_{rated}, jest równa projektowemu obciążeniu grzewczemu, $P_{designh}$, a znamionowa moc cieplna dodatkowego ogrzewacza P_{sup} jest równa dodatkowej mocy grzewczej sup(Tj)			
[2] Do obliczenia SCOP stosowana jest wartość PACK -PCB. Zobacz sekcję „SCOP - szczegółowe obliczenia”			

DANAK-/-
Rejestr testów nr 300-/-

[strona 5 oryginału]-/-

Wyniki testu dla klimatu cieplejszego, niskiej temperatury zgodnie z EN14825-/-

N°	Warunek testu	Moc grzewcza [kW]	COP
1	B	8.315	3.753

Wyniki testów dla klimatu chłodniejszego, niskiej temperatury zgodnie z EN14825-/-

N°	Warunek testu	Moc grzewcza [kW]	COP
1	A	4.876	3.842
2	F&G	6.516	2.673

Wyniki testu COP – niska temperatura – EN 14511-/-

N°	Warunek testu	Moc grzewcza [kW]	COP
1	A7/W35	9.900	4.815

Wyniki testu COP – średnia temperatura – EN 14511-/-

N#	Warunek testu	Moc grzewcza [kW]	COP
1	A7/W55	9.080	2.958

DANAK-/-
Rejestr testów nr 300-/-

[strona 6 oryginału]-/-

Wyniki pomiaru mocy akustycznej – EN 12102-1-/-

N#	Warunek testu	Poziom mocy akustycznej LW(A) [Db RE 1pW]	COP
1[E]	A7/W55	56.4	1.7

E) Oznakowanie ErP

Całkowity poziom mocy akustycznej ważony A jest określany dla mierzonego zakresu częstotliwości od 100 Hz do 10 kHz. Obliczenia niepewności znajdują się w załączniku 1.-/-

Pomiary mocy akustycznej są wykonywane przez Kamalathasan Arumugam (KAMA) i sprawdzane przez Patricka Gliberta (PGL), Duński Instytut Technologiczny.-/-

DANAK-/-
Rejestr testów nr 300-/-

Ja, niżej podpisana Małgorzata Godlewska, tłumacz przysięgły języka angielskiego, wpisana na listę tłumaczy przysięgłych prowadzoną w Ministerstwie Sprawiedliwości pod numerem TP/16/11 poświadczam zgodność niniejszego tłumaczenia z okazanym mi oryginalnym dokumentem w języku angielskim.

Warszawa, 9 września 2024 r.

Repertorium nr 43/2024

OŚWIADCZENIE

Producent Thermoval Polska S.A. oświadcza, iż pompy ciepła

1) TVHP-M08
Oznaczenie/typ/identyfikator modelu

2) TVHP-M10
Oznaczenie/typ/identyfikator modelu

3) TVHP-M12
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.

Piaseczno, 30.09.2024
Miejscowość, data

Robert Piasecki
Dyrektor Techniczny
THERMOVAL POLSKA S. A
Podpis osoby upoważnionej

THERMOVAL POLSKA S.A.
Dział Techniczny
05-500 Piaseczno, ul Okulickiego 21
tel:22 853 70 66
NIP: 9512472037, Regon 381660505