TEST REPORT

Report no.:
300-KLAB-24-002

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File no.: 226011
Enclosures: 1

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-V10WD2N7
	Series no.:	541140007773A18010002Z
	Prod. Year:	Outdoor unit: N/A
Dates:	Component tested:	January – February 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. Between each test condition, Midea has been changing various parameters like compressor speed, expansion valve, fan speed, pump speed, defrost time, heating time.

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

Date: 2024.03.19

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Co-reader:
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DIGITALLY SIGNED DOCUMENT
19 March 2024
DANISH TECHNOLOGICAL INSTITUTE

DIN Geprüft
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-V10WD2N7
Midea	MHC-V10WD2N7-E30
Midea	MHC-V10WD2N7-ER60
Midea	MHC-V10WD2N7-ER90

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 $SCOP_C$ 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[c] - 16) / ($T_{designh}$ − 16)				TOL[c]	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)	
1S	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)	
1S	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	400 L/h	Starting
2	-25	-	48	400 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	33	400	3.73	1.27

E) ErP labelling

Test results

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

Model (Outdoor)	MHC-V10WD2N7
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	**200.4** [%]
	SCOP	**5.09** [-]

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	8.09 [kW]
		Tj=2 °C	Pdh	5.07 [kW]
		Tj=7 °C	Pdh	3.77 [kW]
		Tj=12 °C	Pdh	4.46 [kW]
		Tj=bivalent temperature	Pdh	8.09 [kW]
		Tj=operation limit	Pdh	8.52 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Low temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	2.78 [-]
		Tj=2 °C	COPd	5.07 [-]
		Tj=7 °C	COPd	6.94 [-]
		Tj=12 °C	COPd	9.18 [-]
		Tj=bivalent temperature	COPd	2.78 [-]
		Tj=operation limit	COPd	2.48 [-]

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}	0.008 [kW]
	Thermostat-off mode	P_{TO}	0.009 [kW]
	Standby mode	P_{SB}	0.008 [kW]
	Crankcase heater mode	P_{CK}	0.008 [kW]
Supplementary heater[1]	Rated heat output	P_{SUP}	0.68 [kW]
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q_{HE}	3737 [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-V10WD2N7
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}	**7.8** [kW]
Seasonal space heating energy efficiency	η_s	**156.9** [%]
	SCOP	**4.00** [-]

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	7.07 [kW]
		Tj=2 °C	Pdh	4.22 [kW]
		Tj=7 °C	Pdh	3.69 [kW]
		Tj=12 °C	Pdh	4.23 [kW]
		Tj=bivalent temperature	Pdh	7.07 [kW]
		Tj=operation limit	Pdh	7.86 [kW]

Measured coefficient of performance at outdoor temperature Tj	Average Climate - Medium temperature application	Tj=-15 °C	COPd	- [-]
		Tj=-7 °C	COPd	2.38 [-]
		Tj=2 °C	COPd	3.92 [-]
		Tj=7 °C	COPd	5.31 [-]
		Tj=12 °C	COPd	6.65 [-]
		Tj=bivalent temperature	COPd	2.38 [-]
		Tj=operation limit	COPd	2.02 [-]

Bivalent temperature	Tbivalent	-7 [°C]
Operation limit	TOL	-10 [°C]
temperatures	WTOL	- [°C]
Degradation coefficient	Cdh	0.99 [-]

Power consumption in modes other than active mode	Off mode	P_{OFF}	0.008 [kW]
	Thermostat-off mode	P_{TO}	0.009 [kW]
	Standby mode	P_{SB}	0.008 [kW]
	Crankcase heater mode	P_{CK}	0.008 [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		Variable
	Water flow rate		-
	Annual energy consumption	Q_{HE}	4032 [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	Tbivalent C	5.482	6.214

Test results for colder climate, low temperature according to EN14825

N°	Test condition	Heating capacity [kW]	COP
1	A	4.958	3.741
2	F&G	6.516	2.692

COP test results - low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W35	9.861	4.604

COP test results - medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A7/W55	9.416	3.054

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/W48	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	51.1	1.6

E) ErP labelling

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

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

Photos

Rating plate

Outdoor unit

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	8.09	2.78	1.00	1.00	2.78
B	2	54	4.95	5.07	5.07	0.99	1.00	5.07
C	7	35	3.18	3.77	6.94	0.98	0.84	6.92
D	12	15	1.42	4.46	9.18	0.98	0.32	8.84
E	-10	100	9.20	8.52	2.48	1.00	1.00	2.48
F - BIV	-7	88	8.14	8.09	2.78	1.00	1.00	2.78

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	0.0082	0.0082	0
Thermostat off	178	0.0086	0.0086	1.5308
Standby	0	0.0082	0.0082	0
Crankcase heater	178	0.0082	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	9.20	8.52	0.68	0.68	2.48	9.20	4.11	8.52	3.43
	22	-9	25	8.85	8.38	0.47	11.69	2.58	221.15	92.86	209.46	81.17
	23	-8	23	8.49	8.23	0.26	5.97	2.68	195.32	76.66	189.35	70.68
A / F - BIV	24	-7	24	8.14	8.09	0.00	0.00	2.78	195.32	70.33	195.32	70.33
	25	-6	27	7.78	7.74	0.00	0.00	3.03	210.18	69.33	210.18	69.33
	26	-5	68	7.43	7.39	0.00	0.00	3.29	505.29	153.77	505.29	153.77
	27	-4	91	7.08	7.04	0.00	0.00	3.54	644.00	181.90	644.00	181.90
	28	-3	89	6.72	6.69	0.00	0.00	3.79	598.35	157.67	598.35	157.67
	29	-2	165	6.37	6.35	0.00	0.00	4.05	1050.92	259.52	1050.92	259.52
	30	-1	173	6.02	6.00	0.00	0.00	4.30	1040.66	241.79	1040.66	241.79
	31	0	240	5.66	5.65	0.00	0.00	4.56	1358.77	298.08	1358.77	298.08
	32	1	280	5.31	5.30	0.00	0.00	4.81	1486.15	308.79	1486.15	308.79
B	33	2	320	4.95	4.95	0.00	0.00	5.07	1585.23	312.83	1585.23	312.83
	34	3	357	4.60	4.60	0.00	0.00	5.44	1642.20	302.04	1642.20	302.04
	35	4	356	4.25	4.25	0.00	0.00	5.81	1511.63	260.32	1511.63	260.32
	36	5	303	3.89	3.89	0.00	0.00	6.18	1179.37	190.95	1179.37	190.95
	37	6	330	3.54	3.54	0.00	0.00	6.55	1167.69	178.38	1167.69	178.38
C	38	7	326	3.18	3.18	0.00	0.00	6.92	1038.18	150.12	1038.18	150.12
	39	8	348	2.83	2.83	0.00	0.00	7.30	985.11	134.94	985.11	134.94
	40	9	335	2.48	2.48	0.00	0.00	7.69	829.77	107.97	829.77	107.97
	41	10	315	2.12	2.12	0.00	0.00	8.07	668.77	82.87	668.77	82.87
	42	11	215	1.77	1.77	0.00	0.00	8.45	380.38	44.99	380.38	44.99
D	43	12	169	1.42	1.42	0.00	0.00	8.84	239.20	27.06	239.20	27.06
	44	13	151	1.06	1.06	0.00	0.00	9.22	160.29	17.38	160.29	17.38
	45	14	105	0.71	0.71	0.00	0.00	9.61	74.31	7.73	74.31	7.73
	46	15	74	0.35	0.35	0.00	0.00	9.99	26.18	2.62	26.18	2.62

SUM	19003.66	3734.99	18985.32	3716.65
$SCOP_{on}$		5.09	**$SCOP_{net}$**	5.11

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	6.90	7.07	2.38	1.00	1.00	2.38
B	2	54	4.20	4.22	3.92	0.99	1.00	3.92
C	7	35	2.70	3.69	5.31	0.99	0.73	5.29
D	12	15	1.20	4.23	6.65	0.99	0.28	6.43
E	-10	100	7.80	7.86	2.02	1.00	1.00	2.02
F - BIV	-7	88	6.90	7.07	2.38	1.00	1.00	2.38

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	0.0082	0.0082	0
Thermostat off	178	0.0086	0.0086	1.5308
Standby	0	0.0082	0.0082	0
Crankcase heater	178	0.0082	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	7.80	7.80	0.00	0.00	2.02	7.80	3.85	7.80	3.85
	22	-9	25	7.50	7.50	0.00	0.00	2.14	187.50	87.52	187.50	87.52
	23	-8	23	7.20	7.20	0.00	0.00	2.26	165.60	73.29	165.60	73.29
A / F - BIV	24	-7	24	6.90	6.90	0.00	0.00	2.38	165.60	69.67	165.60	69.67
	25	-6	27	6.60	6.60	0.00	0.00	2.55	178.20	69.92	178.20	69.92
	26	-5	68	6.30	6.30	0.00	0.00	2.72	428.40	157.49	428.40	157.49
	27	-4	91	6.00	6.00	0.00	0.00	2.89	546.00	188.81	546.00	188.81
	28	-3	89	5.70	5.70	0.00	0.00	3.06	507.30	165.60	507.30	165.60
	29	-2	165	5.40	5.40	0.00	0.00	3.24	891.00	275.42	891.00	275.42
	30	-1	173	5.10	5.10	0.00	0.00	3.41	882.30	258.99	882.30	258.99
	31	0	240	4.80	4.80	0.00	0.00	3.58	1152.00	321.94	1152.00	321.94
	32	1	280	4.50	4.50	0.00	0.00	3.75	1260.00	336.00	1260.00	336.00
B	33	2	320	4.20	4.20	0.00	0.00	3.92	1344.00	342.72	1344.00	342.72
	34	3	357	3.90	3.90	0.00	0.00	4.19	1392.30	331.92	1392.30	331.92
	35	4	356	3.60	3.60	0.00	0.00	4.47	1281.60	286.86	1281.60	286.86
	36	5	303	3.30	3.30	0.00	0.00	4.74	999.90	210.91	999.90	210.91
	37	6	330	3.00	3.00	0.00	0.00	5.01	990.00	197.45	990.00	197.45
C	38	7	326	2.70	2.70	0.00	0.00	5.29	880.20	166.48	880.20	166.48
	39	8	348	2.40	2.40	0.00	0.00	5.51	835.20	151.44	835.20	151.44
	40	9	335	2.10	2.10	0.00	0.00	5.74	703.50	122.50	703.50	122.50
	41	10	315	1.80	1.80	0.00	0.00	5.97	567.00	94.96	567.00	94.96
	42	11	215	1.50	1.50	0.00	0.00	6.20	322.50	52.03	322.50	52.03
D	43	12	169	1.20	1.20	0.00	0.00	6.43	202.80	31.56	202.80	31.56
	44	13	151	0.90	0.90	0.00	0.00	6.65	135.90	20.42	135.90	20.42
	45	14	105	0.60	0.60	0.00	0.00	6.88	63.00	9.15	63.00	9.15
	46	15	74	0.30	0.30	0.00	0.00	7.11	22.20	3.12	22.20	3.12

SUM	16111.80	4030.02	16111.80	4030.02
$SCOP_{on}$		4.00	**$SCOP_{net}$**	4.00

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	9.20
Heating demand:	kW	8.14
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**8.087**
COP	-	**2.777**
Power consumption	kW	**2.912**
Measured		
Heating capacity	kW	8.099
COP	-	2.767
Power consumption	kW	2.927
During heating		
Air temperature dry bulb	°C	-7.05
Air temperature wet bulb	°C	-8.18
Inlet temperature	°C	29.02
Outlet temperature	°C	34.03
Outlet temperature (Time averaged)	°C	**34.03**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	4917
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	13
Calculated Power correction	W	15
Water Flow	m^3/s	0.000414

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	9.20
Heating demand:	kW	4.95
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.066**
COP	-	**5.067**
Power consumption	kW	**1.000**
Measured		
Heating capacity	kW	5.072
COP	-	5.037
Power consumption	kW	1.007
During heating		
Air temperature dry bulb	°C	2.00
Air temperature wet bulb	°C	0.93
Inlet temperature	°C	25.03
Outlet temperature	°C	30.04
Outlet temperature (Time averaged)	°C	**30.04**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	3651
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	0.000243

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	9.20
Heating demand:	kW	3.18
CR:	-	0.8
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**3.770**
COP	-	**6.936**
Power consumption	kW	**0.544**
Measured		
Heating capacity	kW	3.778
COP	-	6.834
Power consumption	kW	0.553
During heating		
Air temperature dry bulb	°C	7.01
Air temperature wet bulb	°C	6.00
Inlet temperature	°C	22.87
Outlet temperature	°C	27.74
Outlet temperature (Time averaged)	°C	**26.99**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	6346
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	0.000186

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	9.20
Heating demand:	kW	1.42
CR:	-	0.3
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.461**
COP	-	**9.176**
Power consumption	kW	**0.486**
Measured		
Heating capacity	kW	4.464
COP	-	9.122
Power consumption	kW	0.489
During heating		
Air temperature dry bulb	°C	11.99
Air temperature wet bulb	°C	11.00
Inlet temperature	°C	22.38
Outlet temperature	°C	27.38
Outlet temperature (Time averaged)	°C	**23.97**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	1743
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	0.000214

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	9.20
Heating demand:	kW	9.20
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Transient
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**8.524**
COP	-	**2.482**
Power consumption	kW	**3.434**
Measured		
Heating capacity	kW	8.558
COP	-	2.461
Power consumption	kW	3.477
During heating		
Air temperature dry bulb	°C	-10.18
Air temperature wet bulb	°C	-11.21
Inlet temperature	°C	30.03
Outlet temperature	°C	35.05
Outlet temperature (Time averaged)	°C	**35.05**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	23072
Calculated Hydraulic power	W	10
Calculated global efficiency	η	0.23
Calculated Capacity correction	W	33
Calculated Power correction	W	43
Water Flow	m^3/s	0.000431

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	7.80
Heating demand:	kW	6.90
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**7.067**
COP	-	**2.377**
Power consumption	kW	**2.973**
Measured		
Heating capacity	kW	7.071
COP	-	2.375
Power consumption	kW	2.977
During heating		
Air temperature dry bulb	°C	-6.90
Air temperature wet bulb	°C	-8.08
Inlet temperature	°C	44.00
Outlet temperature	°C	52.01
Outlet temperature (Time averaged)	°C	**52.01**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	2231
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	4
Calculated Power correction	W	4
Water Flow	m^3/s	0.000214

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	7.80
Heating demand:	kW	4.20
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.219**
COP	-	**3.922**
Power consumption	kW	**1.076**
Measured		
Heating capacity	kW	4.223
COP	-	3.910
Power consumption	kW	1.080
During heating		
Air temperature dry bulb	°C	2.21
Air temperature wet bulb	°C	0.99
Inlet temperature	°C	33.98
Outlet temperature	°C	41.96
Outlet temperature (Time averaged)	°C	**41.96**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	3654
Calculated Hydraulic power	W	0
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	3
Calculated Power correction	W	4
Water Flow	m^3/s	0.000128

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	7.80
Heating demand:	kW	2.70
CR:	-	0.7
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**3.689**
COP	-	**5.311**
Power consumption	kW	**0.695**
Measured		
Heating capacity	kW	3.695
COP	-	5.274
Power consumption	kW	0.701
During heating		
Air temperature dry bulb	°C	6.97
Air temperature wet bulb	°C	6.00
Inlet temperature	°C	30.29
Outlet temperature	°C	38.11
Outlet temperature (Time averaged)	°C	**36.02**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	6378
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.12
Calculated Capacity correction	W	5
Calculated Power correction	W	6
Water Flow	m^3/s	0.000114

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	7.80
Heating demand:	kW	1.20
CR:	-	0.3
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.230**
COP	-	**6.646**
Power consumption	kW	**0.636**
Measured		
Heating capacity	kW	4.237
COP	-	6.577
Power consumption	kW	0.644
During heating		
Air temperature dry bulb	°C	11.98
Air temperature wet bulb	°C	10.99
Inlet temperature	°C	27.70
Outlet temperature	°C	35.69
Outlet temperature (Time averaged)	°C	**29.97**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	7476
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	0.000128

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	7.80
Heating demand:	kW	7.80
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**7.858**
COP	-	**2.025**
Power consumption	kW	**3.880**
Measured		
Heating capacity	kW	7.863
COP	-	2.023
Power consumption	kW	3.887
During heating		
Air temperature dry bulb	°C	-9.94
Air temperature wet bulb	°C	-11.10
Inlet temperature	°C	47.02
Outlet temperature	°C	55.01
Outlet temperature (Time averaged)	°C	**55.01**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	3421
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	0.000239

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

Detailed result for 'EN14825:2022' Warmer Low (C) A 7 /W31		
Tested according to:		EN14511:2022 and EN14825:2022
Climate zone:		Warmer
Temperature application:		Low
Condition name:		C
Condition temperature:	°C	7
Part load:	%	64%
Chosen Tbivalent	°C	2
Tdesign	°C	2
Pdesign	kW	8.60
Heating demand:	kW	5.53
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**5.482**
COP	-	**6.214**
Power consumption	kW	**0.882**
Measured		
Heating capacity	kW	5.488
COP	-	6.174
Power consumption	kW	0.889
During heating		
Air temperature dry bulb	°C	7.01
Air temperature wet bulb	°C	6.01
Inlet temperature	°C	26.00
Outlet temperature	°C	30.90
Outlet temperature (Time averaged)	°C	**30.90**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	3036
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	0.000269

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	-7
Tdesign	°C	-22
Pdesign	kW	7.90
Heating demand:	kW	4.78
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**4.958**
COP	-	**3.741**
Power consumption	kW	**1.325**
Measured		
Heating capacity	kW	4.966
COP	-	3.721
Power consumption	kW	1.335
During heating		
Air temperature dry bulb	°C	-7.01
Air temperature wet bulb	°C	-8.00
Inlet temperature	°C	25.01
Outlet temperature	°C	30.07
Outlet temperature (Time averaged)	°C	**30.07**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	5208
Calculated Hydraulic power	W	1
Calculated global efficiency	η	0.13
Calculated Capacity correction	W	8
Calculated Power correction	W	10
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	7.90
Heating demand:	kW	6.44
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**6.516**
COP	-	**2.692**
Power consumption	kW	**2.421**
Measured		
Heating capacity	kW	6.536
COP	-	2.673
Power consumption	kW	2.446
During heating		
Air temperature dry bulb	°C	-15.00
Inlet temperature	°C	26.98
Outlet temperature	°C	32.00
Outlet temperature (Time averaged)	°C	**32.00**
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	13023
Calculated Hydraulic power	W	4
Calculated global efficiency	η	0.16
Calculated Capacity correction	W	21
Calculated Power correction	W	25
Water Flow	m^3/s	0.000313

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 circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**9.861**
COP	-	**4.604**
Power consumption	kW	**2.142**
Measured		
Heating capacity	kW	9.882
COP	-	4.560
Power consumption	kW	2.167
During heating		
Air temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.02
Inlet temperature	°C	30.00
Outlet temperature	°C	35.00
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	8627
Calculated Hydraulic power	W	4
Calculated global efficiency	η	0.16
Calculated Capacity correction	W	21
Calculated Power correction	W	25
Water Flow	m^3/s	0.000476

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 circulation pump:		Yes
Included corrections (Final result)		
Heating capacity	kW	**9.416**
COP	-	**3.054**
Power consumption	kW	**3.083**
Measured		
Heating capacity	kW	9.429
COP	-	3.043
Power consumption	kW	3.098
During heating		
Air temperature dry bulb	°C	7.02
Air temperature wet bulb	°C	5.90
Inlet temperature	°C	46.99
Outlet temperature	°C	55.07
Circulation pump		
Measured: Static differential pressure, liquid pump	Pa	7536
Calculated Hydraulic power	W	2
Calculated global efficiency	η	0.14
Calculated Capacity correction	W	13
Calculated Power correction	W	15
Water Flow	m^3/s	0.000283

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: 07-02-2024

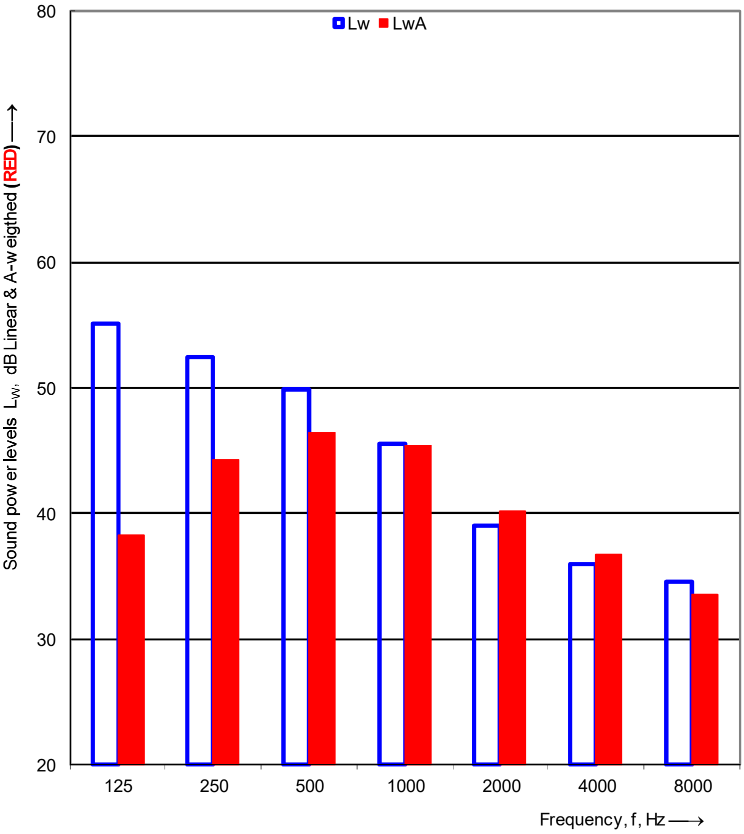
Object: Type: Air to water heat pump Model: MHC-V10WD2N7

Mounting conditions: The outdoor unit is mounted on the supporting metal support frame using six vibration insulatores and placed on four pices 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/W35, Compressor speed: 33[Hz], Fan speed: 400[rpm], Pump speed: 30 [%], EXV1(P): 90, Heating capacity: 3.73 [kW], Power_input: 1.27 [kW], Water flow rate: 410 [l/h]

Static pressure:	99.8 kPa			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	52.4	
125	50.1	55.1
160	46.6	
200	46.7	
250	47.8	52.4
315	48.2	
400	46.3	
500	44.3	49.8
630	44.1	
800	41.6	
1000	40.5	45.6
1250	40.1	
1600	35.4	
2000	34.8	39.0
2500	31.6	
3150	30.7	
4000	29.8	35.9
5000	32.4	
6300	30.6	
8000	28.9	34.6
10000	29.8	



Sound power level L_W(A): 51.1 dB [re 1pW], Uncertainty σtot: 1.6 dB

Name of test institute: DTI   Date: 07-02-2024

No. of test report: 300-KLAB-24-002

Measurements are in full conformity with ISO 3743-1

Appendix 1

Unit specification

Type of unit: Mono air to water heat pump
Manufacturer: Midea
Size of the heat pump: 0.4 x 0.9 x 1.3m (W x L x H)
Year of production: n/a.

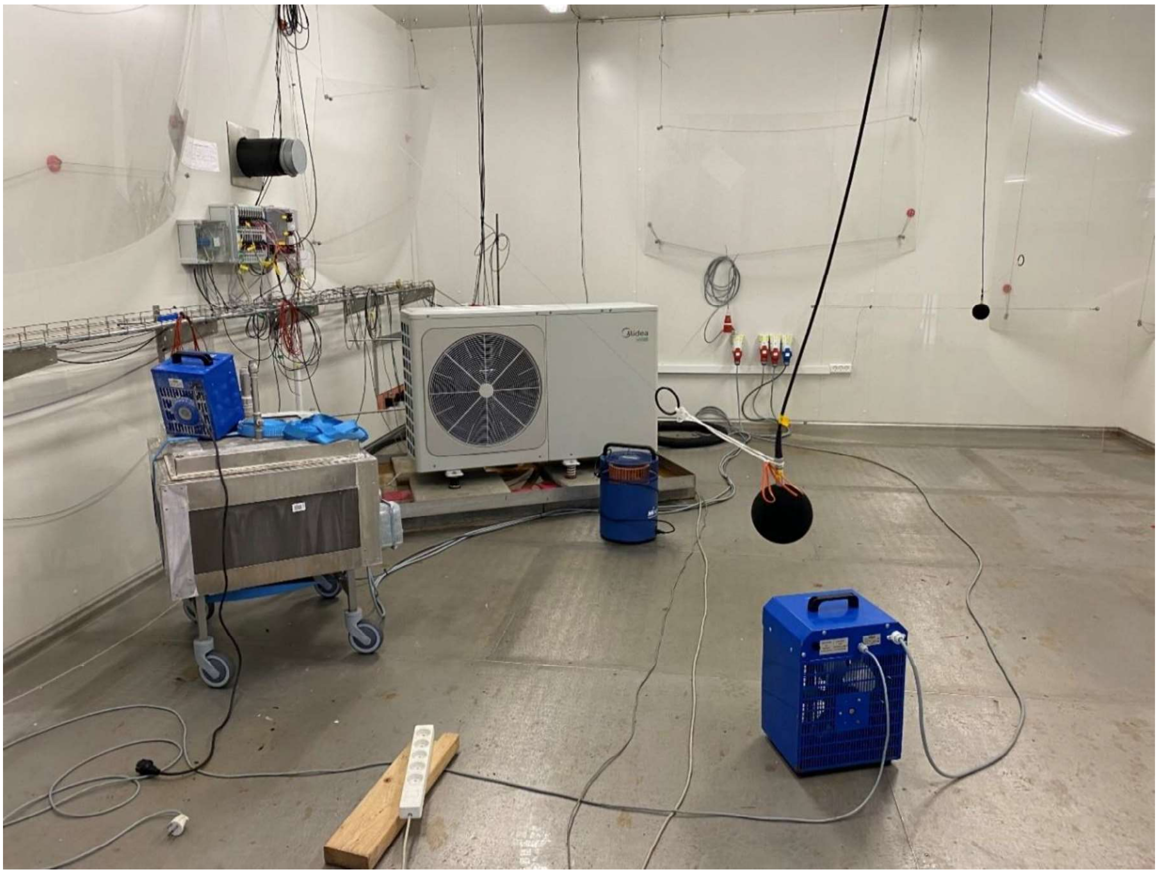
Operating conditions and environment

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	Norsonic A/S, Norway
100870	GRAS	Gras 40AE_26CA, ½" free field microphone, Roof monitor	Norsonic A/S, Norway
100873*	Brüel & Kjær	Acoustical calibrator, Brüel & Kjær 4231	Element Metech, Denmark
100859	Norsonic	Reference sound source, Norsonic Nor278 Room 1	RISE, Sweden
100872*	Norsonic	Reference sound source, Norsonic Nor278 Room 2	RISE, Sweden
100620*	Norsonic	Multi-channel measurement system Nor850	Norsonic A/S, Norway

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

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

Test Procedure

The measurements of the emitted sound power level from the heat pump are carried out according to the following 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. However, the uncertainty is rounded up to the nearest 0.5 or 1.0dB increment in the report. As pr. Table C.1 (accuracy grade 2), the uncertainty σ_{RO} is set to 1.5.

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

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

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

RAPORT Z BADANIA

Raport nr:
300-KLAB-24-002

[logo]
DUŃSKI INSTYTUT TECHNOLOGICZNY

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

Ref.: RTHI/KAMA
Nr pliku: 226011
Załącznik: 1

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
	Typ:	Pompa ciepła powietrze-woda (monoblok)
	Model:	MHC-V10WD2N7
	Nr serii:	541140007773A180100022
	Rok prod:	Jednostka zewnętrzna: NIE DOTYCZY
Daty:	Badany komponent:	Styczeń - Luty 2024

Procedura: Aby zapoznać się z listą norm, patrz cel (strona 2)

Uwagi: Urządzenie zostało dostarczone przez klienta. Montaż i ustawienia badawcze zostały wykonane zgodnie z instrukcjami producenta. Pomiędzy każdym badaniem Midea zmieniono różne parametry obejmujące prędkość sprężarki, zawór rozprężny, prędkość wentylatora, prędkość pompy, czas odszraniania, czas nagrzewania.

Warunki: Niniejsze badanie został przeprowadzone w ramach akredytacji zgodnie z międzynarodowymi wymogami (ISO/IEC 17025:2017) oraz zgodnie z Ogólnymi Warunkami Duńskiego Instytutu Technologicznego. Wyniki badania odnoszą się wyłącznie do badanego przedmiotu. Niniejszy raport z badania może być publikowany we fragmentach wyłącznie za pisemną zgodą Duńskiego Instytutu Technologicznego.

Klient nie może powoływać się na Duński Instytut Technologiczny lub pracowników Duńskiego Instytutu Technologicznego w celach reklamowych lub marketingowych, chyba że Duński Instytut Technologiczny udzielił pisemnej zgody w każdym przypadku.

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

Data: 2024.03.19

Podpisał:
Rasmus Thisgaard
B.TecMan & MarEng

Sprawdził:
Kamathasan Arumugam
Inżynier

[logotypy]
Nr badania 300

TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Pompy ciepła o identycznej konstrukcji

Według GD MIDEA HEATING & VENTILATING EQUIPMENT CO. LTD. Pompy ciepła wymienione w poniższej tabeli są uważane za identyczne z badaną jednostką. Mają one identyczne parametry:

a. wydajność grzewcza
b. cykl czynnika chłodniczego (w tym masa czynnika chłodniczego)
c. źródło ciepła i medium pochłaniające
d. główne komponenty / zasada eksploatacji i strategia sterowania
e. ta sama obudowa zewnętrzna

Midea	MHC-V10WD2N7
Midea	MHC-V10WD2N7-E30
Midea	MHC-V10WD2N7-ER60
Midea	MHC-V10WD2N7-ER90

MAŁGORZATA KOSTRUBA TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Cel

Celem niniejszego raportu jest udokumentowanie następujących kwestii:

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

W celu obliczenia SCOP przeprowadzono badania w warunkach obciążenia częściowego podanych w tabelach na stronie 5 i 6.

Badanie obciążenia częściowego SCOP w warunkach $SCOP_C$ przy zastosowaniu w niskiej temperaturze dla cieplejszego klimatu zgodnie z EN 14825:2022.

Warunki badania obciążenia częściowego: $SCOP_A$ i $SCOP_{F/G}$ przy zastosowaniu w niskiej temperaturze dla chłodniejszego klimatu zgodnie z EN 14825:2022.

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

Wymagania eksploatacyjne zgodnie z normą EN 14511-4:2022
- 4.2.1 Badania rozruchowe i eksploatacyjne
- 4.5 Odcięcie przepływu nośnika ciepła
- 4.6 Całkowita awaria zasilania

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

MAŁGORZATA KUSTOŃ-SKARA TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Warunki badawcze

Warunki badawcze SCOP dla niskich temperatur - EN 14825

Warunki częściowego obciążenia dla referencyjnego SCOP i referencyjnego SCOPon przy obliczaniu jednostek powietrze-woda dla zastosowań niskotemperaturowych dla referencyjnego sezonu grzewczego; „A" = umiar. klimat, „W" = cieplejszy klimat, „C" = zimniejszy klimat.

	Współczynnik obciążenia częściowego w %				**Zewnętrzny wymiennik ciepła**		**Wewnętrzny wymiennik ciepła**			
					Temperatura termometru suchego (mokrego) °C		Stały wylot °C	Zmienny wylot[d] °C		
	Wzór	Umiar.	Cieplejszy	Chłodniejszy	Powietrze zewnętrz.	Wylot powietrza	Wszystkie klimaty	Umiar.	Cieplejszy	Chłodniejszy
A	(-7 - 16) / (Tdesignh - 16)	88,46	nie dotyczy	60,53	-7(-8)	20(12)	a/35	a/34	nie dotyczy	a/30
B	(+2 - 16) / (Tdesignh - 16)	53,85	100,00	36,84	2(1)	20(12)	a/35	a/30	a/35	a/27
C	(+7 - 16) / (Tdesignh - 16)	34,62	64,29	23,68	7(6]	20(12)	a/35	a/27	a/31	a/25
D	(+12 - 16) / (Tdesignh - 16)	15,38	28,57	10,53	12(11]	20(12)	a/35	a/24	a/26	a/24
E	(***TOLe – 16) /*** (Tdesignh - 16)				***TOLe***	20(12)	a/35	a/b	a/b	a/b
F	***(Tbiv – 16) /*** (Tdesignh - 16)				***Tbiv***	20(12)	a/35	a/c	a/c	a/c
G	(-15 - 16) / (Tdesignh - 16)	nie dotyczy	nie dotyczy	81,58	-15	20(12)	a/35	nie dotyczy	nie dotyczy	a/32

Dodatkowe informacje

Klimat	**Tdesignh [°C]**	**Tbivalent [°C]**	**TOL [°C]**	**Temperatura na wylocie**	**Natężenie przepływu**
Klimat umiar.	-10	-7	-10	Zmienna	Zmienne
Klimat cieplejszy	2	7	2	Zmienna	Zmienne
Klimat zimniejszy	-22	-15	-22	Zmienna	Zmienne

MAŁGORZATA ... TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Warunki badawcze SCOP dla średnich temperatur - EN 14825

Warunki częściowego obciążenia dla referencyjnego SCOP i referencyjnego SCOPon przy obliczaniu jednostek powietrze-woda dla zastosowań średniotemperaturowych dla referencyjnego sezonu grzewczego; „A" = umiar. klimat, „W" = cieplejszy klimat, „C" = zimniejszy klimat.

	Współczynnik obciążenia częściowego w %				**Zewnętrzny wymiennik ciepła**		**Wewnętrzny wymiennik ciepła**			
					Temperatura termometru suchego (mokrego) °C		Stały wylot °C	Zmienny wylot[d] °C		
	Wzór	Umiar.	Cieplejszy	Chłodniejszy	Powietrze zewnętrz.	Wylot powietrza	**Wszystkie klimaty**	Umiar.	Cieplejszy	Chłodniejszy
A	(-7 - 16) / (Tdesignh - 16)	88,46	nie dotyczy	60,53	-7(-8)	20(12)	a/55	a/52	nie dotyczy	a/44
B	(+2 - 16) / (Tdesignh - 16)	53,85	100,00	36,84	2(1)	20(12)	a/55	a/42	a/55	a/37
C	(+7 - 16) / (Tdesignh - 16)	34,62	64,29	23,68	7(6]	20(12)	a/55	a/36	a/46	a/32
D	(+12 - 16) / (Tdesignh - 16)	15,38	28,57	10,53	12(11]	20(12)	a/55	a/30	a/34	a/28
E	***(TOLe – 16) /*** (Tdesignh - 16)				***TOLe***	20(12)	a/55	a/b	a/b	a/b
F	***(Tbiv – 16) /*** (Tdesignh - 16)				***Tbiv***	20(12)	a/55	a/c	a/c	a/c
G	(-15 - 16) / (Tdesignh - 16)	nie dotyczy	nie dotyczy	81,58	-15	20(12)	a/55	nie dotyczy	nie dotyczy	a/49

Dodatkowe informacje

Klimat	**Tdesignh [°C]**	**Tbivalent [°C]**	**TOL [°C]**	**Temperatura na wylocie**	**Natężenie przepływu**
Klimat umiar.	-10	-7	-10	Zmienna	Zmienne

[logotypy]
Nr badania 300

Warunki badania COP - niska temperatura - EN 14511

Nr	Źródło ciepła		Radiator		Ustawienia pompy ciepła
	Temperatura termometru suchego na wlocie (°C)	Temperatura termometru mokrego na wlocie (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)	
1S	7	6	30	35	

S: Standardowy warunek oceny

Warunki badania COP - średnia temperatura - EN 14511

Nr	Źródło ciepła		Radiator		Ustawienia pompy ciepła
	Temperatura termometru suchego na wlocie (°C)	Temperatura termometru mokrego na wlocie (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)	
1S	7	6	47	55	

S: Standardowy warunek oceny

Warunki badawcze dla wymagań eksploatacyjnych - EN 14511-4

Nr	Źródło ciepła		Radiator	Natężenie przepływu wody w wewnętrznym wymienniku ciepła	Badanie
	Temperatura termometru suchego na wlocie (°C)	Temperatura termometru mokrego na wlocie (°C)	Temperatura na wlocie (°C)		
1	-25	-	12	800 L/h	Rozruchowe
2	-25	-	38	710 L/h	Eksploatacyjne

MAŁGORZATA ... TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Warunki badawcze odcięcia nośnika ciepła - EN 14511-4

Nr	Źródło ciepła		Radiator		Wymiennik ciepła
	Temperatura termometru suchego na wlocie (°C)	Temperatura termometru mokrego na wlocie (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)	
1	7	6	47	55	Wewnętrzny
2	7	6	47	55	Zewnętrzny

Warunki badania dla całkowitej awarii zasilania - EN 14511-4

Nr	Źródło ciepła		Radiator	
	Temperatura termometru suchego na wlocie (°C)	Temperatura termometru mokrego na wlocie (°C)	Temperatura na wlocie (°C)	Temperatura na wylocie (°C)
1	7	6	47	55

Warunki badawcze dla pomiarów mocy akustycznej - EN 12102-1

Nr	Warunki badania		Ustawienie pompy ciepła			
	Zewnętrzny wymiennik ciepła (termometr suchy / mokry) (°C)	Wewnętrzny wymiennik ciepła (wlot / wylot) (°C)	Prędkość sprężarki (Hz)	Prędkość wentylatora na zewnątrz (obr./min)	Moc grzewcza (kW)	Moc wejściow (kW)
1E	7/6	47/55	33	400	3,73	1,27

E) Oznaczenie ErP

Wyniki badania

Wyniki badania SCOP w niskiej temperaturze - średnia sezonu grzewczego- EN 14825

Model (zewnętrzny)	MHC-V10WD2N7
Monoblokowa pompa ciepła powietrze-woda	T
Niskotemperaturowa pompa ciepła	N
Wyposażony w dodatkową grzałkę	N
Kombinowany podgrzewacz z pompą ciepła	N
Odwracalny	T

Znamionowa moc cieplna 1)		**Pznam.**		9,2 [kW]
Sezonowa efektywność energetyczna ogrzewania pomieszczeń		ns		200,4 [%]
		SCOP		5,09 [-]
Zmierzona wydajność ogrzewania dla częściowego obciążenia przy temperaturze zewnętrznej Tj	Klimat umiarkowany Zastosowanie w niskich temperaturach	Tj=-15 °C	Pdh	- [kW]
		Tj=-7 °C	Pdh	8,09 [kW]
		Tj=2 °C	Pdh	5,07 [kW]
		Tj=7 °C	Pdh	3,77 [kW]
		Tj=12 °C	Pdh	4,46 [kW]
		Tj= temperatura dwuwartościowa	Pdh	8,09 [kW]
		Tj= limit operacyjny	Pdh	8,52 [kW]
Zmierzony współczynnik wydajności w temperaturze zewnętrznej Tj	Klimat umiarkowany Zastosowanie w niskich temperaturach	Tj=-15 °C	COPd	-[-]
		Tj=-7 °C	COPd	2,78 [-]
		Tj=2 °C	COPd	5,07 [-]
		Tj=7 °C	COPd	6,94 [-]
		Tj=12 °C	COPd	9,18 [-]
		Tj= temperatura dwuwartościowa	COPd	2.78 [-]
		Tj= limit operacyjny	COPd	2,48 [-]
Temperatura dwuwartościowa		Tbivalent		-7 [°C]
Limit eksploatacji		TOL		-10 [°C]
temperatury		WTOL		-[°C]]
Współczynnik degradacji		Cdh		0,98 [-]
Zużycie energii w trybach innych niż tryb aktywny		Tryb Off	POFF	0,008 [kW]
		Termostat - Tryb off	PTO	0,009 [kW]
		Tryb gotowości	**PSB**	0,008 [kW]
		Tryb grzałki skrzyni korbowej 2)	**PCK**	0,008 [kW]
Grzałka dodatkowa 1)		Znamionowa moc cieplna Rodzaj pobieranej energii	Psup	0,68[kW] Elektryczna
Inne przedmioty		Kontrola wydajności		Zmienna
		Kontrola przepływu wody		Zmienna
		Natężenie przepływu wody		-
		Roczne zużycie energii	QHE	3737 [kWh]

1) W przypadku ogrzewaczy pomieszczeń z pompą ciepła i wielofunkcyjnych ogrzewaczy z pompą ciepła znamionowa moc cieplna, Pznam., jest równa projektowemu obciążeniu grzewczemu, Pdesignh, a wskaźnik* mocy cieplnej dodatkowego ogrzewacza, Psup, jest równy dodatkowej wydajności grzewczej, sup(Tj).

2) Do obliczenia SCOP używana jest wartość PCK - PSB. Patrz sekcja "SCOP - szczegółowe obliczenia"

NR TP/313/07

Wyniki badania SCOP w średniej temperaturze - średnia sezonu grzewczego - EN 14825

Model (Zewnętrzny)	MHC-V10WD2N7
Monoblokowa pompa ciepła powietrze-woda	T
Niskotemperaturowa pompa ciepła	N
Wyposażony w dodatkową grzałkę	N
Kombinowany podgrzewacz z pompą ciepła	N
Odwracalny	T

Znamionowa moc cieplna 1)		**Pznam.**		7,8 [kW]
Sezonowa efektywność energetyczna ogrzewania pomieszczeń		ns		156,9 [%]
		SCOP		4,00 [-]
Zmierzona wydajność ogrzewania dla częściowego obciążenia przy temperaturze zewnętrznej Tj	Klimat umiarkowany Zastosowanie w niskich temperaturach	Tj=-15 °C	Pdh	- [kW]
		Tj=-7 °C	Pdh	7,07 [kW]
		Tj=2 °C	Pdh	4,22 [kW]
		Tj=7 °C	Pdh	3,69 [kW]
		Tj=12 °C	Pdh	4,23 [kW]
		Tj= temperatura dwuwartościowa	Pdh	7,07 [kW]
		Tj= limit operacyjny	Pdh	7,86 [kW]
Zmierzony współczynnik wydajności w temperaturze zewnętrznej Tj	Klimat umiarkowany Zastosowanie w niskich temperaturach	Tj=-15 °C	COPd	-[-]
		Tj=-7 °C	COPd	2,38 [-]
		Tj=2 °C	COPd	3,92 [-]
		Tj=7 °C	COPd	5,31 [-]
		Tj=12 °C	COPd	6,65 [-]
		Tj= temperatura dwuwartościowa	COPd	2,38 [-]
		Tj= limit operacyjny	COPd	2,02 [-]
Temperatura dwuwartościowa		Tbivalent		-7 [°C]
Limit eksploatacji		TOL		-10 [°C]
temperatury		WTOL		- [°C]
Współczynnik degradacji		Cdh		0,99 [-]
Zużycie energii w trybach innych niż tryb aktywny		Tryb Off	POFF	0,008 [kW]
		Termostat - Tryb off	PTO	0,009 [kW]
		Tryb gotowości	**PSB**	0,008 [kW]
		Tryb grzałki skrzyni korbowej	**PCK**	0,008 [kW]
Grzałka dodatkowa 1)		Znamionowa moc cieplna Rodzaj pobieranej energii	Psup	0,00 [kW] Elektryczna
Inne przedmioty		Kontrola wydajności		Zmienna
		Kontrola przepływu wody		Zmienna
		Natężenie przepływu wody		-
		Roczne zużycie energii	QHE	4032[kWh]

1) W przypadku ogrzewaczy pomieszczeń z pompą ciepła i wielofunkcyjnych ogrzewaczy z pompą ciepła znamionowa moc cieplna, Pznam., jest równa projektowemu obciążeniu grzewczemu, Pdesignh, a wskaźnik* mocy cieplnej dodatkowego ogrzewacza, Psup, jest równy dodatkowej wydajności grzewczej, sup(Tj).

2) Do obliczenia SCOP używana jest wartość PCK - PSB. Patrz sekcja "SCOP - szczegółowe obliczenia"

[logotypy]
Nr badania 300

TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Wyniki badań dla cieplejszego klimatu, niska temperatura zgodnie z EN14825

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	Tbivalent C	5,482	6,214

Wyniki badań dla chłodniejszego klimatu, niska temperatura zgodnie z EN14825

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	A	4,958	3,741
2	Tbivalent F i G	6,516	2,692

Wyniki badania COP - niska temperatura - EN 14511

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	A7/W35	9,861	4,604

Wyniki badania COP - średnia temperatura - EN 14511

Nr	Warunki badania	Moc grzewcza [kW]	COP
1	A7/W55	9,416	3,054

MAŁGORZATA KUŚ-ROMSKA
TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO
NR TP/313/07

Wyniki badania rozruchu i eksploatacji - EN 14511-4

Nr	Warunki badawcze wlot powietrza/wody [°C]	Ocena badania
Rozruch	A-25/W12	Zaliczono
Eksploatacja	A-25/W48	Zaliczono

Wyniki badania odcięcia nośnika ciepła - EN 14511-4

Nr	Wymiennik ciepła	Ocena badania
1	Wewnętrzny	Zaliczono
2	Zewnętrzny	Zaliczono

Wyniki badania dla całkowitej awarii zasilania - EN 14511-4

Nr	Ocena badania
1	Zaliczono

MAŁGORZATA AUSTROWSKA TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO NR TP/313/07

Wyniki pomiarów mocy akustycznej - EN 12102-1

Nr	Warunki badania	Poziom mocy akustycznej LW(A) [dB re 1pW]	Niepewność σ_{tot} [dB]
1F	A7/W55	51,5	1,6

E) Oznaczenie ErP

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

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

Ja, Małgorzata Kostrowska tłumacz przysięgły języka angielskiego (wpisana na listę tłumaczy przysięgłych Ministra Sprawiedliwości pod Nr TP/313/07), zaświadczam zgodność powyższego tłumaczenia z przedłożonym dokumentem sporządzonym w języku angielskim.
Nr rep.: 1232/2024
Data: 09.04.2024

MAŁGORZATA KOSTROWSKA
TŁUMACZ PRZYSIĘGŁY JĘZYKA ANGIELSKIEGO
NR TP/313/07

OŚWIADCZENIE

Producent **GD Midea Heating & Ventilating Equipment Co. Ltd (Penglai industry road, Beijiao, Shunde, Foshan, Guangdong, P.R China)** oświadcza, iż pompy ciepła

1) MHC-V4W/D2N7-E30
Oznaczenie/typ/identyfikator modelu

2) MHC-V6W/D2N7-E30
Oznaczenie/typ/identyfikator modelu

3) MHC-V8W/D2N7-E30
Oznaczenie/typ/identyfikator modelu

4) MHC-V10W/D2N7-E30
Oznaczenie/typ/identyfikator modelu

5) MHC-V12W/D2RN7-E30
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.

23.04.2024
Miejscowość, data

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Podpis osoby upoważnionej