

# TEST REPORT

Report no.:  
300-KLAB-23-010



**DANISH  
TECHNOLOGICAL  
INSTITUTE**

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

Page 1 of 58  
Init: RTHI/KAMA  
File no.: 147989  
Enclosures: 1

**Customer:** Company: Panasonic Marketing Europe GmbH  
Address: Hagenauer Str. 43  
City: D-65203 Wiesbaden  
Tel.: +49 1724 141441

**Component:** Brand: Panasonic  
Type: Air to water heat pump  
Model: Outdoor Unit: WH-UDZ07KE5 Indoor Unit: WH-ADC0309K3E5  
Series no.: Outdoor Unit: 5624301068 Indoor Unit: 5706600032  
Prod. year: Outdoor Unit: 2023.02 Indoor Unit: N/A

**Dates:** Component tested: April 2023 – June 2023

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

**Remarks:** The unit was delivered by the customer. The installation and test settings were done according to the manufacturer's instructions. All tests are done with enabled defrost mode. The unit was delivered as model no. WH-UDZ09KE5, cf. the rating plates of the units. By changing the software, the unit was changed to model no. WH-UDZ07KE5

**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.

The customer may not mention or refer to Danish Technological Institute or Danish Technological Institute's employees for advertising or marketing purposes unless Danish Technological Institute has granted its written consent in each case.

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

**Date:** 2023.11.01

**Signature:**  
Rasmus Thisgaard  
B.TecMan & MarEng

**Co-reader:**  
Kamalathasan Arumugam  
B.Sc. Engineer



Test Req. nr.



## Objective

The objective of this report is to document the following:

The Seasonal Coefficient of Performance (SCOP) at low and medium temperature application for average climate according to EN 14825:2018. In order to calculate the SCOP, tests were carried out at the part load conditions stated in the tables on page 5 and 6.

Rating conditions at low temperature application (heating mode) according to EN 14511:2018 at A7/W35, A2/W35 and A-7/W35.

Rating conditions at medium temperature application (heating mode) according to EN 14511:2018 at A7/W55, A2/W55 and A-7/W55.

Additional performance test at quiet mode 3 according to EN 14511:2018 at A2/W35.

Operating requirements according to EN 14511-4:2018:

- 4.2.1 Starting and operating tests
- 4.5 Shutting off the heat transfer medium flows
- 4.6 Complete power supply failure

The Seasonal Energy Efficiency Ratio (SEER) for space cooling for fan coil application according to EN 14825:2018. In order to calculate the SEER, tests were carried out at the part load conditions stated in the tables on page 8.

Pre-running and post-running time of liquid pump when the heat pump starts and stops.

Power consumption of liquid pump for COP and SCOP test points.

Sound power measurements according to EN 12102-1:2017, chosen by the manufacturer.

This report includes all the requirements for the European KEYMARK Scheme for Heat Pumps.





## Contents:

<b>Test conditions .....</b>	<b>5</b>
SCOP test conditions for low temperature – EN 14825 .....	5
SCOP test conditions for medium temperature – EN 14825 .....	6
Test conditions for rating conditions low temperature – EN 14511.....	7
Test conditions for rating conditions medium temperature – EN 14511 .....	7
Test condition for quiet mode 3 – EN 14511 .....	7
SEER test conditions for fan coil application – EN 14825 .....	8
Test conditions for starting and operating tests – EN 14511-4: 2018.....	8
Test conditions for shutting off the heat transfer medium – EN 14511-4 .....	9
Test conditions for complete power supply failure – EN 14511-4 .....	9
Test conditions for sound power measurements – EN 12102-1 .....	10
<b>Test results.....</b>	<b>11</b>
Test results of SCOP test at low temperature - heating season average – EN 14825.....	11
Test results of SCOP test at medium temperature - heating season average – EN 14825 .....	12
Test results of standard rating test at low temperature – EN 14511.....	13
Test results of standard rating test at medium temperature – EN 14511 .....	13
Test results of quiet mode 3 – EN 14511.....	13
Test results of SEER test at fan cooling application for space cooling - EN 14825 .....	14
Test results of starting and operating tests – EN 14511-4:2018.....	15
Test results of shutting off the heat transfer medium – EN 14511-4 .....	15
Test results of complete power supply failure – EN 14511-4 .....	15
Pre-running and post-running time of liquid pump when the heat pump starts and stops .....	16
Power consumption of liquid pump for COP test points.....	16
Power consumption of liquid pump for SCOP test points – low temperature application .....	17
Power consumption of liquid pump for SCOP test points – medium temperature application .....	17
Test results of sound power measurements – EN 12102 .....	18
<b>Photo .....</b>	<b>19</b>
<b>SCOP - detailed calculation .....</b>	<b>21</b>
Detailed SCOP calculation of low temperature and average climate conditions – EN 14825.....	21
Detailed SCOP calculation of medium temperature and average climate conditions – EN 14825 .....	23
<b>SEER - detailed calculation .....</b>	<b>25</b>
Detailed SEER calculation of fan coil application – EN 14825.....	25
<b>Detailed test results .....</b>	<b>27</b>
Detailed SCOP test results - low temperature application – EN 14825.....	27
Detailed SCOP test results - medium temperature application - EN 14825.....	32
Detailed test results for rating conditions – low temperature – EN 14511.....	37





Detailed test results for rating conditions – medium temperature – EN 14511 .....	40
Detailed test results for rating condition – quiet mode – EN 14511.....	43
Detailed SEER test result – fan coil application – EN 14825.....	44
Detailed test results of sound power measurement .....	48
<b>Appendix 1: Test Procedure .....</b>	<b>58</b>





## Test conditions

### SCOP test conditions for low temperature – EN 14825

Part load conditions for reference SCOP and reference SCOP<sub>on</sub> calculation of air to water units for low temperature application for the reference heating season;

"A" = average, "W" = warmer, and "C" = colder.

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

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

<sup>b</sup> Variable outlet shall be calculated by interpolation from T<sub>designh</sub> and the temperature which is closest to the TOL.

<sup>c</sup> Variable outlet shall be calculated by interpolation between the upper and lower temperatures which are closest to the bivalent temperature.

<sup>d</sup> If the variable outlet temperature is below the minimum of the operation range of the unit, this minimum should be considered.

Conditions C and F = Keymark

### Additional information

Climate	T <sub>designh</sub> [°C]	T <sub>bivalent</sub> [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-10	-10	Variable	Variable





## SCOP test conditions for medium temperature – EN 14825

Part load conditions for reference SCOP and reference SCOP<sub>on</sub> calculation of air to water units for medium temperature application for the reference heating season;

"A" = average, "W" = warmer, and "C" = colder.

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

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

<sup>b</sup> Variable outlet shall be calculated by interpolation T<sub>designh</sub> and the temperature which is closest to the TOL.

<sup>c</sup> Variable outlet shall be calculated by interpolation between the upper and lower temperatures which are closest to the bivalent temperature.

<sup>d</sup> If the variable outlet temperature is below the minimum of the operation range of the unit, this minimum should be considered.

Conditions C and F = Keymark

Additional information

Climate	T <sub>designh</sub> [°C]	T <sub>bivalent</sub> [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-7	-10	Variable	Variable



### Test conditions for rating conditions low temperature – EN 14511

N <sup>#</sup>	Heat source		Heat sink		
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1 <sup>K</sup>	7	6	30	35	
2	2	1	30	35	
3	-7	-8	30	35	

K) Keymark

### Test conditions for rating conditions medium temperature – EN 14511

N <sup>#</sup>	Heat source		Heat sink		
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1 <sup>K</sup>	7	6	47	55	
2	2	1	47	55	
3	-7	-8	47	55	

K) Keymark

### Test condition for quiet mode 3 – EN 14511

N <sup>#</sup>	Heat source		Heat sink		
	Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)	
1	2	1	30	35	



## SEER test conditions for fan coil application – EN 14825

Part load conditions for reference SEER and reference SEERon calculation of air to water units for fan coil application for space cooling.

Part load ratio	Part load ratio  %	Outdoor heat exchanger	Indoor heat exchanger			
		Air dry bulb temperature  °C	Fan coil application Inlet/outlet water(brine) temperatures		Cooling floor application Inlet/outlet water(brine) temperatures	
			Fixed outlet °C	Variable outlet <sup>b</sup> °C		
A	$(35-16)/(T_{\text{designc}}-16)$	100	35	12 / 7	12 / 7	23 / 18
B	$(30-16)/(T_{\text{designc}}-16)$	74	30	<sup>a</sup> / 7	<sup>a</sup> / 8,5	<sup>a</sup> / 18
C	$(25-16)/(T_{\text{designc}}-16)$	47	25	<sup>a</sup> / 7	<sup>a</sup> / 10	<sup>a</sup> / 18
D	$(20-16)/(T_{\text{designc}}-16)$	21	20	<sup>a</sup> / 7	<sup>a</sup> / 11,5	<sup>a</sup> / 18
<sup>a</sup> With the flow rate as determined during "A" test for units with a fixed flow rate or with a fixed delta $T$ of 5 K for units with a variable flow rate. If for any of the test conditions the resulting flow rate is below the minimum flow rate then this minimum flow rate is used as a fixed flow rate with the outlet temperature for this test condition. <sup>b</sup> if the variable outlet temperature is above the maximum of the operating range of the unit, this maximum should be considered.						

Conditions A and C (for fan coil) = Keymark

## Test conditions for starting and operating tests – EN 14511-4: 2018

N <sup>#</sup>	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 <sup>K</sup>	-25	-	15	Minimum	Starting
2 <sup>K</sup>	-25	-	47	Minimum	Operating

K) Keymark





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

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

K) Keymark

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

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

K) Keymark



## Test conditions for sound power measurements – EN 12102-1

N <sup>#</sup>	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 <sup>R</sup>	7/6	30/35	54	570	7.10	1.42
2 <sup>Q</sup>	7/6	30/35	36	420	4.80	0.93
3 <sup>R</sup>	7/6	47/55	57	540	6.60	2.21
4 <sup>Q</sup>	7/6	47/55	37	370	4.40	1.46
5 <sup>R</sup>	-7/-8	30/35	70	730	6.00	1.88
6 <sup>Q</sup>	-7/-8	30/35	45	570	4.00	1.2
7 <sup>R</sup>	-7/-8	47/55	70	730	5.30	1.60
8 <sup>Q</sup>	-7/-8	47/55	45	570	3.40	1.60
9 <sup>E-K</sup>	7/6	47/55	26	450	2.70	1.12
10 <sup>Q</sup>	2/1	30/35	54	550	6.10	1.43

R) Rating capacity, Q) Quiet mode 3, E) ErP labelling, K) Keymark



## Test results

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

<b>Model (Outdoor)</b>	WH-UDZ07KE5
<b>Air-to-water heat pump mono bloc</b>	N
<b>Low-temperature heat pump</b>	N
<b>Equipped with supplementary heater</b>	Y
<b>Heat pump combination heater</b>	Y

<b>Rated heat output<sup>1)</sup></b>	$P_{rated}$	<b>7 [kW]</b>
<b>Seasonal space heating energy efficiency</b>	$\eta_s$	<b>204.3 [%]</b>
	SCOP	<b>5.18 [-]</b>

<b>Measured capacity for heating for part load at outdoor temperature <math>T_j</math></b>	Average Climate	$T_j = -15\text{ °C}$	$P_{dh}$	- [kW]
	-	$T_j = -7\text{ °C}$	$P_{dh}$	6.46 [kW]
	Low temperature application	$T_j = 2\text{ °C}$	$P_{dh}$	3.83 [kW]
		$T_j = 7\text{ °C}$	$P_{dh}$	2.83 [kW]
		$T_j = 12\text{ °C}$	$P_{dh}$	3.27 [kW]
		$T_j = \text{bivalent temperature}$	$P_{dh}$	6.88 [kW]
		$T_j = \text{operation limit}$	$P_{dh}$	6.88 [kW]

<b>Measured coefficient of performance at outdoor temperature <math>T_j</math></b>	Average Climate	$T_j = -15\text{ °C}$	COPd	- [-]
	-	$T_j = -7\text{ °C}$	COPd	3.17 [-]
	Low temperature application	$T_j = 2\text{ °C}$	COPd	4.94 [-]
		$T_j = 7\text{ °C}$	COPd	7.04 [-]
		$T_j = 12\text{ °C}$	COPd	8.97 [-]
		$T_j = \text{bivalent temperature}$	COPd	2.99 [-]
		$T_j = \text{operation limit}$	COPd	2.99 [-]

<b>Bivalent temperature</b>	$T_{bivalent}$	-10 [°C]
<b>Operation limit temperatures</b>	TOL	-10 [°C]
	WTOL	- [°C]
<b>Degradation coefficient</b>	$C_{dh}$	0.98 [-]

<b>Power consumption in modes other than active mode</b>	Off mode	$P_{OFF}$	0.007 [kW]
	Thermostat-off mode	$P_{TO}$	0.007 [kW]
	Standby mode	$P_{SB}$	0.007 [kW]
	Crankcase heater mode	$P_{CK}$	0.007 [kW]
<b>Supplementary heater<sup>1)</sup></b>	Rated heat output	$P_{SUP}$	0.00 [kW]
	Type of energy input		Electrical

<b>Other items</b>	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		Variable
	Annual energy consumption	$Q_{HE}$	2790 [kWh]

<sup>1)</sup>For heat pump space heaters and heat pump combination heaters, the rated heat output,  $P_{rated}$ , is equal to the design load for heating,  $P_{designh}$ , and the rated heat output of a supplementary heater,  $P_{sup}$ , is equal to the supplementary capacity for heating,  $sup(T_j)$ .

Conditions C (7 °C) and F (bivalent temperature) = Keymark



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

<b>Model (Outdoor)</b>		WH-UDZ07KE5	
<b>Air-to-water heat pump mono bloc</b>		N	
<b>Low-temperature heat pump</b>		N	
<b>Equipped with supplementary heater</b>		Y	
<b>Heat pump combination heater</b>		Y	
<b>Rated heat output<sup>1)</sup></b>	$P_{rated}$	<b>7 [kW]</b>	
<b>Seasonal space heating energy efficiency</b>	$\eta_s$	<b>152.2 [%]</b>	
	SCOP	<b>3.88 [-]</b>	
<b>Measured capacity for heating for part load at outdoor temperature <math>T_j</math></b>	Average Climate	$T_j = -15\text{ °C}$	$P_{dh}$ - [kW]
	-	$T_j = -7\text{ °C}$	$P_{dh}$ 6.52 [kW]
	Medium temperature application	$T_j = 2\text{ °C}$	$P_{dh}$ 3.89 [kW]
		$T_j = 7\text{ °C}$	$P_{dh}$ 2.67 [kW]
		$T_j = 12\text{ °C}$	$P_{dh}$ 3.14 [kW]
		$T_j = \text{bivalent temperature}$	$P_{dh}$ 6.52 [kW]
		$T_j = \text{operation limit}$	$P_{dh}$ 6.41 [kW]
<b>Measured coefficient of performance at outdoor temperature <math>T_j</math></b>	Average Climate	$T_j = -15\text{ °C}$	COPd - [-]
	-	$T_j = -7\text{ °C}$	COPd 2.27 [-]
	Medium temperature application	$T_j = 2\text{ °C}$	COPd 3.82 [-]
		$T_j = 7\text{ °C}$	COPd 5.13 [-]
		$T_j = 12\text{ °C}$	COPd 6.86 [-]
		$T_j = \text{bivalent temperature}$	COPd 2.27 [-]
		$T_j = \text{operation limit}$	COPd 1.88 [-]
<b>Bivalent temperature</b>	$T_{bivalent}$	<b>-7 [°C]</b>	
<b>Operation limit temperatures</b>	TOL	<b>-10 [°C]</b>	
	WTOL	<b>- [°C]</b>	
<b>Degradation coefficient</b>	$C_{dh}$	<b>0.98 [-]</b>	
<b>Power consumption in modes other than active mode</b>	Off mode	$P_{OFF}$	0.007 [kW]
	Thermostat-off mode	$P_{TO}$	0.007 [kW]
	Standby mode	$P_{SB}$	0.007 [kW]
	Crankcase heater mode	$P_{CK}$	0.007 [kW]
<b>Supplementary heater<sup>1)</sup></b>	Rated heat output	$P_{SUP}$	0.59 [kW]
	Type of energy input	Electrical	
<b>Other items</b>	Capacity control	Variable	
	Water flow control	Variable	
	Water flow rate	Variable	
	Annual energy consumption	$Q_{HE}$	3728 [kWh]

<sup>1)</sup>For heat pump space heaters and heat pump combination heaters, the rated heat output,  $P_{rated}$ , is equal to the design load for heating,  $P_{designh}$ , and the rated heat output of a supplementary heater,  $P_{sup}$ , is equal to the supplementary capacity for heating,  $sup(T_j)$ .

Conditions C (7 °C) and F (bivalent temperature) = Keymark



### Test results of standard rating test at low temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1 <sup>K</sup>	A7/W35	7.07	5.13
2	A2/W35	6.82	3.70
3	A-7/W35	6.03	3.31

K) Keymark

### Test results of standard rating test at medium temperature – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1 <sup>K</sup>	A7/W55	6.56	3.04
2	A2/W55	6.32	2.35
3	A-7/W55	5.29	2.09

K) Keymark

### Test results of quiet mode 3 – EN 14511

N#	Test conditions	Heating capacity [kW]	COP
1	A2/W35	5.09	4.02





## Test results of SEER test at fan cooling application for space cooling - EN 14825

Model (Outdoor)		WH-UDZ07KE5		
Air-to-water heat pump mono bloc		N		
Low-temperature heat pump		N		
Equipped with supplementary heater		Y		
Heat pump combination heater		Y		
Rated cooling output	$P_{rated,c}$	6 [kW]		
	$\eta_{s,c}$	216.7 [%]		
	SEER	5.49 [-]		
	Air dry bulb temperature	$T_j=35\text{ }^{\circ}\text{C}$	$P_{dc}$	5.72 [kW]
		$T_j=30\text{ }^{\circ}\text{C}$	$P_{dc}$	4.30 [kW]
		$T_j=25\text{ }^{\circ}\text{C}$	$P_{dc}$	3.18 [kW]
		$T_j=20^{\circ}\text{C}$	$P_{dc}$	2.65 [kW]
		$T_j=35\text{ }^{\circ}\text{C}$	EERd	3.33 [-]
		$T_j=30\text{ }^{\circ}\text{C}$	EERd	4.45 [-]
		$T_j=25\text{ }^{\circ}\text{C}$	EERd	6.95 [-]
$T_j=20^{\circ}\text{C}$	EERd	6.92 [-]		
Degradation coefficient	$C_{dc}$	0.98 [-]		
Power consumption in modes other than active mode	Off mode	$P_{OFF}$	0.007 [kW]	
	Thermostat-off mode	$P_{TO}$	0.007 [kW]	
	Standby mode	$P_{SB}$	0.007 [kW]	
	Crankcase heater mode	$P_{CK}$	0.007 [kW]	
Supplementary heater	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	$Q_{HE}$	382 [kWh]	

Conditions A (35 °C) and C (25 °C) = Keymark



### Test results of starting and operating tests – EN 14511-4:2018

N#	Test conditions	Water flow rate at indoor heat exchanger (l/h)	Test validation
1 <sup>K</sup>	A-25/W15	480	Passed
2 <sup>K</sup>	A-25/W47	480	Passed

K) Keymark

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

N#	Test conditions	Test validation
1 <sup>K</sup>	A7/W35	Passed

K) Keymark

### Test results of complete power supply failure – EN 14511-4

N#	Test conditions	Test validation
1 <sup>K</sup>	A7/W35	Passed

K) Keymark



## Pre-running and post-running time of liquid pump when the heat pump starts and stops

N#	Pre-running time in seconds (S)	Post-running time in seconds (S)
1 <sup>K</sup>	186	60

K) Keymark

## Power consumption of liquid pump for COP test points

N#	COP test points	Measured power consumption (W)	Test mode no.
1	A7/W35	48	1
2	A2/W35	48	1
3	A-7/W35	48	1
4	A7/W55	36	1
5	A2/W55	37	1
6	A-7/W55	34	1

The power consumptions of the liquid pump have been measured separately.



### Power consumption of liquid pump for SCOP test points – low temperature application

N#	SCOP test points	Measured power consumption (W)	Test mode no.
1	A12/W24	36	3
2	A7/W27	35	4
3	A2/W30	38	5
4	A-7/W34	48	6
5	A-10/W35	48	7

The power consumptions of the liquid pump have been measured separately.

### Power consumption of liquid pump for SCOP test points – medium temperature application

N#	SCOP test points	Measured power consumption (W)	Test mode no.
1	A12/W30	36	8
2	A7/W36	35	9
3	A2/W42	34	10
4	A-7/W52	37	11
5	A-10/W55	37	12

The power consumptions of the liquid pump have been measured separately.



## Test results of sound power measurements – EN 12102

N <sup>#</sup>	Test conditions	Sound power level LW(A) [dB re 1pW]	Uncertainty (dB) (weighted value)
1 <sup>R</sup>	A7/W35	61.8	1.0
2 <sup>Q</sup>	A7/W35	55.6	0.5
3 <sup>R</sup>	A7/W55	61.0	1.0
4 <sup>Q</sup>	A7/W55	56.6	1.0
5 <sup>R</sup>	A-7/W35	66.0	0.5
6 <sup>Q</sup>	A-7/W35	60.6	0.5
7 <sup>R</sup>	A-7/W55	66.6	0.5
8 <sup>Q</sup>	A-7/W55	62.8	1.0
9 <sup>E-K</sup>	A7/W55	56.4	0.5
10 <sup>Q</sup>	A2/35	59.6	0.5

R) Rating capacity, Q) Quiet mode 3, E) ERP labelling K) Keymark

The uncertainty value is a weighted value using the level and frequency dependant influence for each 1/1-octave level on the final A-weighted sound power level.

The A-weighted total sound power level is determined for the measured frequency range from 100 Hz to 10 kHz.

The sound power measurements are carried out by Kamalathan Arumugam (KAMA) and co-read by Birger Bech Jessen (BBJN).



Test Req. nr.





Photo

## Rating plate

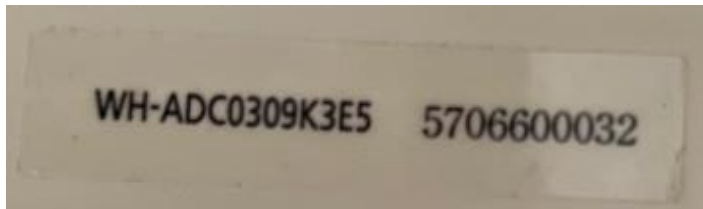


## Unit





## Rating plate indoor unit



## Indoor unit





## SCOP - detailed calculation

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

#### Calculation of reference SCOP

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

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	6.19	6.46	3.17	1.00	1.00	3.17
B	2	54	3.77	3.83	4.94	0.99	1.00	4.94
C	7	35	2.42	2.83	7.04	0.98	0.86	7.02
D	12	15	1.08	3.27	8.97	0.98	0.33	8.62
E	-10	100	7.00	6.88	2.99	1.00	1.00	2.99
F - BIV	-10	100	7.00	6.88	2.99	1.00	1.00	2.99

#### 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	0.0067	0.0067	0
Thermostat off	178	0.0073	0.0073	1.2994
Standby	0	0.0067	0.0067	0
Crankcase heater	178	0.0066	0	0



Calculation Bin for SCOP<sub>on</sub>

	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 <sub>bin</sub> [-]	Annual heating demand [kWh]	Annual energy input [kWh]	Net annual heating capacity [kWh]	Net annual power input [kWh]
<b>E / F - BIV</b>	21	-10	1	7.00	6.88	0.00	0.00	2.99	7.00	2.34	7.00	2.34
	22	-9	25	6.73	6.65	0.00	0.00	3.05	168.27	55.17	168.27	55.17
	23	-8	23	6.46	6.42	0.00	0.00	3.11	148.62	47.79	148.62	47.79
<b>A</b>	24	-7	24	6.19	6.19	0.00	0.00	3.17	148.62	46.88	148.62	46.88
	25	-6	27	5.92	5.92	0.00	0.00	3.37	159.92	47.50	159.92	47.50
	26	-5	68	5.65	5.65	0.00	0.00	3.56	384.46	107.89	384.46	107.89
	27	-4	91	5.38	5.38	0.00	0.00	3.76	490.00	130.32	490.00	130.32
	28	-3	89	5.12	5.12	0.00	0.00	3.96	455.27	115.06	455.27	115.06
	29	-2	165	4.85	4.85	0.00	0.00	4.15	799.62	192.52	799.62	192.52
	30	-1	173	4.58	4.58	0.00	0.00	4.35	791.81	182.02	791.81	182.02
	31	0	240	4.31	4.31	0.00	0.00	4.55	1033.85	227.39	1033.85	227.39
	32	1	280	4.04	4.04	0.00	0.00	4.74	1130.77	238.39	1130.77	238.39
<b>B</b>	33	2	320	3.77	3.77	0.00	0.00	4.94	1206.15	244.16	1206.15	244.16
	34	3	357	3.50	3.50	0.00	0.00	5.36	1249.50	233.30	1249.50	233.30
	35	4	356	3.23	3.23	0.00	0.00	5.77	1150.15	199.28	1150.15	199.28
	36	5	303	2.96	2.96	0.00	0.00	6.19	897.35	145.03	897.35	145.03
	37	6	330	2.69	2.69	0.00	0.00	6.60	888.46	134.56	888.46	134.56
<b>C</b>	38	7	326	2.42	2.42	0.00	0.00	7.02	789.92	112.55	789.92	112.55
	39	8	348	2.15	2.15	0.00	0.00	7.34	749.54	102.14	749.54	102.14
	40	9	335	1.88	1.88	0.00	0.00	7.66	631.35	82.44	631.35	82.44
	41	10	315	1.62	1.62	0.00	0.00	7.98	508.85	63.78	508.85	63.78
	42	11	215	1.35	1.35	0.00	0.00	8.30	289.42	34.88	289.42	34.88
<b>D</b>	43	12	169	1.08	1.08	0.00	0.00	8.62	182.00	21.12	182.00	21.12
	44	13	151	0.81	0.81	0.00	0.00	8.94	121.96	13.64	121.96	13.64
	45	14	105	0.54	0.54	0.00	0.00	9.26	56.54	6.11	56.54	6.11
	46	15	74	0.27	0.27	0.00	0.00	9.58	19.92	2.08	19.92	2.08

<b>SUM</b>	14459.31	2788.34	14459.31	2788.34
<b>SCOP<sub>on</sub></b>		5.19	<b>SCOP<sub>net</sub></b>	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	6.19	6.52	2.27	1.00	1.00	2.27
B	2	54	3.77	3.89	3.82	0.99	1.00	3.82
C	7	35	2.42	2.67	5.13	0.99	1.00	5.13
D	12	15	1.08	3.14	6.86	0.98	0.34	6.66
E	-10	100	7.00	6.41	1.88	1.00	1.00	1.88
F - BIV	-7	88	6.19	6.52	2.27	1.00	1.00	2.27

### 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	0.0067	0.0067	0
Thermostat off	178	0.0073	0.0073	1.2994
Standby	0	0.0067	0.0067	0
Crankcase heater	178	0.0066	0	0





Calculation Bin for SCOP<sub>on</sub>

	Bin	Outdoor temperature	Hours	Heat load	Heat load covered by heat pump	Electrical back up heater	backup heater energy input	COP <sub>bin</sub>	Annual heating demand	Annual energy input	Net annual heating capacity	Net annual power input
	[-]	[°C]	[h]	[kW]	[kW]	[kW]	[kWh]	[-]	[kWh]	[kWh]	[kWh]	[kWh]
<b>E</b>	21	-10	1	7.00	6.41	0.59	0.59	1.88	7.00	4.00	6.41	3.41
	22	-9	25	6.73	6.34	0.39	9.83	2.01	168.27	88.66	158.44	78.82
	23	-8	23	6.46	6.26	0.20	4.52	2.14	148.62	71.86	144.09	67.33
<b>A / F - BIV</b>	24	-7	24	6.19	6.19	0.00	0.00	2.27	148.62	65.47	148.62	65.47
	25	-6	27	5.92	5.92	0.00	0.00	2.44	159.92	65.48	159.92	65.48
	26	-5	68	5.65	5.65	0.00	0.00	2.61	384.46	147.05	384.46	147.05
	27	-4	91	5.38	5.38	0.00	0.00	2.79	490.00	175.84	490.00	175.84
	28	-3	89	5.12	5.12	0.00	0.00	2.96	455.27	153.86	455.27	153.86
	29	-2	165	4.85	4.85	0.00	0.00	3.13	799.62	255.38	799.62	255.38
	30	-1	173	4.58	4.58	0.00	0.00	3.30	791.81	239.70	791.81	239.70
	31	0	240	4.31	4.31	0.00	0.00	3.48	1033.85	297.46	1033.85	297.46
	32	1	280	4.04	4.04	0.00	0.00	3.65	1130.77	309.99	1130.77	309.99
<b>B</b>	33	2	320	3.77	3.77	0.00	0.00	3.82	1206.15	315.75	1206.15	315.75
	34	3	357	3.50	3.50	0.00	0.00	4.08	1249.50	306.10	1249.50	306.10
	35	4	356	3.23	3.23	0.00	0.00	4.34	1150.15	264.77	1150.15	264.77
	36	5	303	2.96	2.96	0.00	0.00	4.61	897.35	194.82	897.35	194.82
	37	6	330	2.69	2.69	0.00	0.00	4.87	888.46	182.51	888.46	182.51
<b>C</b>	38	7	326	2.42	2.42	0.00	0.00	5.13	789.92	153.98	789.92	153.98
	39	8	348	2.15	2.15	0.00	0.00	5.44	749.54	137.90	749.54	137.90
	40	9	335	1.88	1.88	0.00	0.00	5.74	631.35	109.98	631.35	109.98
	41	10	315	1.62	1.62	0.00	0.00	6.05	508.85	84.16	508.85	84.16
	42	11	215	1.35	1.35	0.00	0.00	6.35	289.42	45.57	289.42	45.57
<b>D</b>	43	12	169	1.08	1.08	0.00	0.00	6.66	182.00	27.34	182.00	27.34
	44	13	151	0.81	0.81	0.00	0.00	6.96	121.96	17.52	121.96	17.52
	45	14	105	0.54	0.54	0.00	0.00	7.27	56.54	7.78	56.54	7.78
	46	15	74	0.27	0.27	0.00	0.00	7.57	19.92	2.63	19.92	2.63

<b>SUM</b>	14459.31	3725.56	14444.36	3710.61
<b>SCOP<sub>on</sub></b>		3.88	<b>SCOP<sub>net</sub></b>	3.89



## SEER - detailed calculation

### Detailed SEER calculation of fan coil application – EN 14825

#### Calculation of reference SEER

Where

$P_{\text{design}}$  = Cooling load of the building at design temperature, kW  
 $H_{\text{he}}$  = Number of equivalent heating hours, 350 h  
 $H_{\text{TO}}, H_{\text{SB}}, H_{\text{CK}}, H_{\text{OFF}}$  = 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

$P_{\text{TO}}, P_{\text{SB}}, P_{\text{CK}}, P_{\text{OFF}}$  = Electricity consumption during thermostat off mode, standby mode, crankcase heater mode and off mode, kW, respectively

#### Data for SEER

	Outdoor temperature [°C]	Part load ratio [%]	Part load [kW]	Declared capacity [kW]	Declared EER [-]	cdc [-]	CR [-]	EERbin [-]
A	35	100	6.00	5.72	3.33	1.00	1.00	3.33
B	30	74	4.42	4.30	4.45	0.99	1.00	4.45
C	25	47	2.84	3.18	6.95	0.98	0.89	6.94
D	20	21	1.26	2.65	6.92	0.98	0.48	6.78

#### 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	0.00665	0.00665	0
Thermostat off	221	0.00723	0.00723	1.59783
Standby	2142	0.00665	0.00665	14.2443
Crankcase heater	2672	0.00665	0	0

Where

$P_{\text{design}}$  = Cooling load of the building at design temperature, kW  
 $H_{\text{he}}$  = Number of equivalent heating hours, 350 h  
 $H_{\text{TO}}, H_{\text{SB}}, H_{\text{CK}}, H_{\text{OFF}}$  = 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

$P_{\text{TO}}, P_{\text{SB}}, P_{\text{CK}}, P_{\text{OFF}}$  = Electricity consumption during thermostat off mode, standby mode, crankcase heater mode and off mode, kW, respectively





### Calculation Bin for SEERon

	Bin	Outdoor temperature [°C]	Hours [h]	Cooling load [kW]	EERbin [-]	Annual cooling demand [kWh]	Annual energy input [kWh]
	1	17	205	0.32	6.78	64.74	9.55
	2	18	227	0.63	6.78	143.37	21.15
	3	19	225	0.95	6.78	213.16	31.44
<b>D</b>	4	20	225	1.26	6.78	284.21	41.92
	5	21	216	1.58	6.81	341.05	50.07
	6	22	215	1.89	6.84	407.37	59.54
	7	23	218	2.21	6.87	481.89	70.10
	8	24	197	2.53	6.91	497.68	72.07
<b>C</b>	9	25	178	2.84	6.94	505.89	72.93
	10	26	158	3.16	6.44	498.95	77.48
	11	27	137	3.47	5.94	475.89	80.09
	12	28	109	3.79	5.44	413.05	75.86
	13	29	88	4.11	4.95	361.26	73.02
<b>B</b>	14	30	63	4.42	4.45	278.53	62.59
	15	31	39	4.74	4.23	184.74	43.71
	16	32	31	5.05	4.00	156.63	39.14
	17	33	24	5.37	3.78	128.84	34.10
	18	34	17	5.68	3.55	96.63	27.19
<b>A</b>	19	35	13	6.00	3.33	78.00	23.42
	20	36	9	6.32	3.33	56.84	17.07
	21	37	4	6.63	3.33	26.53	7.97
	22	38	3	6.95	3.33	20.84	6.26
	23	39	1	7.26	3.33	7.26	2.18
	24	40	0	7.58	3.33	0.00	0.00

<b>SUM</b>	5723.37	998.86
<b>SEERon</b>		5.73





## Detailed test results

### Detailed SCOP test results - low temperature application – EN 14825

Detailed result for 'EN14825:2018' Average Low (A) A -7 /W34		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:	Average	
Temperature application:	Low	
Condition name:	A	
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent:	°C	-10
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	6.19
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:	Transient	
Integrated liquid pump:	Yes	
Integrated liquid pump able to generate a positive ext. static pressure difference:	Yes	
Included corrections (Final result)		
Heating capacity	kW	6.457
COP	-	3.174
Power consumption	kW	2.034
Measured		
Heating capacity	kW	6.497
COP	-	3.117
Power consumption	kW	2.085
During heating		
Air_inlet temperature dry bulb	°C	-7.02
Air temperature wet bulb	°C	-8.14
Air_outlet temperature dry bulb	°C	-10.31
Water_inlet temperature	°C	29.03
water_outlet temperature	°C	34.14
Water_outlet temperature (Time averaged)	°C	34.14
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	44997
Calculated Hydraulic power	W	15
Calculated global efficiency	η	0.27
Calculated Capacity correction	W	40
Calculated Power correction	W	55
Water Flow	m³/s	0.000330



Detailed result for 'EN14825:2018' Average Low (B) A 2 /W30		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:	Average	
Temperature application:	Low	
Condition name:	B	
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent:	°C	-10
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	3.77
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:	Transient	
Integrated liquid pump:	Yes	
Integrated liquid pump able to generate a positive ext. static pressure difference:	Yes	
Included corrections (Final result)		
Heating capacity	kW	3.826
COP	-	4.939
Power consumption	kW	0.775
Measured		
Heating capacity	kW	3.858
COP	-	4.738
Power consumption	kW	0.814
During heating		
Air_inlet temperature dry bulb	°C	2.02
Air temperature wet bulb	°C	0.94
Air_outlet temperature dry bulb	°C	-0.80
Water_inlet temperature	°C	25.01
water_outlet temperature	°C	30.09
Water_outlet temperature (Time averaged)	°C	30.09
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	45112
Calculated Hydraulic power	W	9
Calculated global efficiency	η	0.22
Calculated Capacity correction	W	32
Calculated Power correction	W	41
Water Flow	m³/s	0.000199





<b>Detailed result for 'EN14825:2018' Average Low (C) A 7 /W27</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Low
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tbivalent:	°C	-10
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	2.42
CR:	-	0.9
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>2.831</b>
COP	-	<b>7.038</b>
Power consumption	kW	<b>0.402</b>
<b>Measured</b>		
Heating capacity	kW	2.858
COP	-	6.565
Power consumption	kW	0.435
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	5.90
Air_outlet temperature dry bulb	°C	4.75
Water_inlet temperature	°C	22.84
water_outlet temperature	°C	27.88
Water_outlet temperature (Time averaged)	°C	<b>27.15</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	47277
Calculated Hydraulic power	W	6
Calculated global efficiency	$\eta$	0.19
Calculated Capacity correction	W	27
Calculated Power correction	W	33
Water Flow	m <sup>3</sup> /s	0.000136



<b>Detailed result for 'EN14825:2018' Average Low (D) A 12 /W24</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Low
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tbivalent:	°C	-10
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	1.08
CR:	-	0.3
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>3.269</b>
COP	-	<b>8.968</b>
Power consumption	kW	<b>0.365</b>
<b>Measured</b>		
Heating capacity	kW	3.298
COP	-	8.226
Power consumption	kW	0.401
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	12.00
Air temperature wet bulb	°C	10.89
Air_outlet temperature dry bulb	°C	8.68
Water_inlet temperature	°C	22.40
water_outlet temperature	°C	27.41
Water_outlet temperature (Time averaged)	°C	<b>24.05</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	46496
Calculated Hydraulic power	W	7
Calculated global efficiency	η	0.20
Calculated Capacity correction	W	29
Calculated Power correction	W	36
Water Flow	m <sup>3</sup> /s	0.000158



<b>Detailed result for 'EN14825:2018' Average Low (E and F) A -10 /W35</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Low
Condition name:		E and F
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tbivalent:	°C	-10
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	7.00
CR:	-	1.0
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>6.876</b>
COP	-	<b>2.990</b>
Power consumption	kW	<b>2.300</b>
<b>Measured</b>		
Heating capacity	kW	6.916
COP	-	2.936
Power consumption	kW	2.356
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	-9.98
Air temperature wet bulb	°C	-11.13
Air_outlet temperature dry bulb	°C	-12.84
Water_inlet temperature	°C	29.99
water_outlet temperature	°C	35.09
Water_outlet temperature (Time averaged)	°C	<b>35.09</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	46995
Calculated Hydraulic power	W	15
Calculated global efficiency	η	0.27
Calculated Capacity correction	W	41
Calculated Power correction	W	56
Water Flow	m <sup>3</sup> /s	0.000326



## Detailed SCOP test results - medium temperature application - EN 14825

Detailed result for 'EN14825:2018' Average Medium (A and F) A -7 /W52		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:	Average	
Temperature application:	Medium	
Condition name:	A and F	
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent:	°C	-7
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	6.19
CR:	-	1.0
Minimum flow reached:	-	Yes
Measurement type:	Steady State	
Integrated liquid pump:	Yes	
Integrated liquid pump able to generate a positive ext. static pressure difference:	Yes	
Included corrections (Final result)		
Heating capacity	kW	6.522
COP	-	2.265
Power consumption	kW	2.880
Measured		
Heating capacity	kW	6.554
COP	-	2.242
Power consumption	kW	2.924
During heating		
Air_inlet temperature dry bulb	°C	-6.97
Air temperature wet bulb	°C	-8.22
Air_outlet temperature dry bulb	°C	-9.20
Water_inlet temperature	°C	44.01
water_outlet temperature	°C	52.29
Water_outlet temperature (Time averaged)	°C	52.29
Circulation pump		
Measured external static pressure difference, liquid pump	Pa	49429
Calculated Hydraulic power	W	9
Calculated global efficiency	η	0.22
Calculated Capacity correction	W	33
Calculated Power correction	W	42
Water Flow	m³/s	0.000191



<b>Detailed result for 'EN14825:2018' Average Medium (B) A 2 /W42</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Medium
Condition name:		B
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent:	°C	-7
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	3.77
CR:	-	1.0
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>3.891</b>
COP	-	<b>3.820</b>
Power consumption	kW	<b>1.019</b>
<b>Measured</b>		
Heating capacity	kW	3.918
COP	-	3.726
Power consumption	kW	1.052
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	2.12
Air temperature wet bulb	°C	0.88
Air_outlet temperature dry bulb	°C	-0.24
Water_inlet temperature	°C	35.01
water_outlet temperature	°C	42.09
Water_outlet temperature (Time averaged)	°C	<b>42.09</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	47206
Calculated Hydraulic power	W	6
Calculated global efficiency	$\eta$	0.19
Calculated Capacity correction	W	27
Calculated Power correction	W	33
Water Flow	m <sup>3</sup> /s	0.000133



<b>Detailed result for 'EN14825:2018' Average Medium (C) A 7 /W36</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Medium
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tbivalent:	°C	-7
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	2.42
CR:	-	1.0
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>2.666</b>
COP	-	<b>5.126</b>
Power consumption	kW	<b>0.520</b>
<b>Measured</b>		
Heating capacity	kW	2.694
COP	-	4.859
Power consumption	kW	0.554
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.00
Air_outlet temperature dry bulb	°C	4.97
Water_inlet temperature	°C	31.23
water_outlet temperature	°C	36.10
Water_outlet temperature (Time averaged)	°C	<b>36.10</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	51466
Calculated Hydraulic power	W	7
Calculated global efficiency	η	0.20
Calculated Capacity correction	W	28
Calculated Power correction	W	35
Water Flow	m <sup>3</sup> /s	0.000133



<b>Detailed result for 'EN14825:2018' Average Medium (D) A 12 /W30</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Medium
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tbivalent:	°C	-7
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	1.08
CR:	-	0.3
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>3.142</b>
COP	-	<b>6.858</b>
Power consumption	kW	<b>0.458</b>
<b>Measured</b>		
Heating capacity	kW	3.168
COP	-	6.458
Power consumption	kW	0.491
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	12.00
Air temperature wet bulb	°C	10.91
Air_outlet temperature dry bulb	°C	9.50
Water_inlet temperature	°C	28.10
water_outlet temperature	°C	33.82
Water_outlet temperature (Time averaged)	°C	<b>30.06</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	47547
Calculated Hydraulic power	W	6
Calculated global efficiency	η	0.19
Calculated Capacity correction	W	27
Calculated Power correction	W	33
Water Flow	m <sup>3</sup> /s	0.000133





<b>Detailed result for 'EN14825:2018' Average Medium (E) A -10 /W55</b>		
Tested according to:	EN14511:2018 and EN14825:2018	
Climate zone:		Average
Temperature application:		Medium
Condition name:		E
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tbivalent:	°C	-7
Tdesign:	°C	-10
Pdesign:	kW	7.00
Heating demand:	kW	7.00
CR:	-	1.0
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>6.409</b>
COP	-	<b>1.879</b>
Power consumption	kW	<b>3.411</b>
<b>Measured</b>		
Heating capacity	kW	6.442
COP	-	1.866
Power consumption	kW	3.453
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	-9.93
Air temperature wet bulb	°C	-10.97
Air_outlet temperature dry bulb	°C	-11.70
Water_inlet temperature	°C	46.99
water_outlet temperature	°C	55.01
Water_outlet temperature (Time averaged)	°C	<b>55.01</b>
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	50111
Calculated Hydraulic power	W	10
Calculated global efficiency	η	0.23
Calculated Capacity correction	W	33
Calculated Power correction	W	43
Water Flow	m <sup>3</sup> /s	0.000194



## Detailed test results for rating conditions – low temperature – EN 14511

<b>Detailed result for 'EN14511:2018' A7/W35</b>		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>7.069</b>
COP	-	<b>5.134</b>
Power consumption	kW	<b>1.377</b>
<b>Measured</b>		
Heating capacity	kW	7.108
COP	-	4.971
Power consumption	kW	1.430
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	5.91
Air_outlet temperature dry bulb	°C	2.85
Water_inlet temperature	°C	30.01
water_outlet temperature	°C	34.95
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	40475
Calculated Hydraulic power	W	14
Calculated global efficiency	$\eta$	0.26
Calculated Capacity correction	W	39
Calculated Power correction	W	53
Water Flow	m <sup>3</sup> /s	0.000346



<b>Detailed result for 'EN14511:2018' A2/W35</b>		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Transient
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>6.817</b>
COP	-	<b>3.701</b>
Power consumption	kW	<b>1.842</b>
<b>Measured</b>		
Heating capacity	kW	6.855
COP	-	3.622
Power consumption	kW	1.892
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	2.09
Air temperature wet bulb	°C	0.84
Air_outlet temperature dry bulb	°C	-2.60
Water_inlet temperature	°C	30.03
water_outlet temperature	°C	35.02
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	30682
Calculated Hydraulic power	W	13
Calculated global efficiency	$\eta$	0.25
Calculated Capacity correction	W	38
Calculated Power correction	W	50
Water Flow	m <sup>3</sup> /s	0.000417



<b>Detailed result for 'EN14511:2018' A-7/W35</b>		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>6.031</b>
COP	-	<b>3.311</b>
Power consumption	kW	<b>1.821</b>
<b>Measured</b>		
Heating capacity	kW	6.067
COP	-	3.246
Power consumption	kW	1.869
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	-6.98
Air temperature wet bulb	°C	-8.10
Air_outlet temperature dry bulb	°C	-10.32
Water_inlet temperature	°C	30.01
water_outlet temperature	°C	35.03
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	40485
Calculated Hydraulic power	W	12
Calculated global efficiency	$\eta$	0.25
Calculated Capacity correction	W	36
Calculated Power correction	W	48
Water Flow	m <sup>3</sup> /s	0.000291



## Detailed test results for rating conditions – medium temperature – EN 14511

<b>Detailed result for 'EN14511:2018' A7/W55</b>		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>6.564</b>
COP	-	<b>3.044</b>
Power consumption	kW	<b>2.156</b>
<b>Measured</b>		
Heating capacity	kW	6.595
COP	-	3.003
Power consumption	kW	2.196
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	7.00
Air temperature wet bulb	°C	6.00
Air_outlet temperature dry bulb	°C	3.22
Water_inlet temperature	°C	47.01
water_outlet temperature	°C	55.01
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	43868
Calculated Hydraulic power	W	9
Calculated global efficiency	$\eta$	0.22
Calculated Capacity correction	W	31
Calculated Power correction	W	40
Water Flow	m <sup>3</sup> /s	0.000200



**Detailed result for 'EN14511:2018' A2/W55**

Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Transient
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>6.317</b>
COP	-	<b>2.352</b>
Power consumption	kW	<b>2.686</b>
<b>Measured</b>		
Heating capacity	kW	6.350
COP	-	2.327
Power consumption	kW	2.729
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	2.11
Air temperature wet bulb	°C	0.89
Air_outlet temperature dry bulb	°C	-1.64
Water_inlet temperature	°C	47.03
water_outlet temperature	°C	55.05
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	45815
Calculated Hydraulic power	W	10
Calculated global efficiency	$\eta$	0.23
Calculated Capacity correction	W	33
Calculated Power correction	W	43
Water Flow	m <sup>3</sup> /s	0.000213



<b>Detailed result for 'EN14511:2018' A-7/W55</b>		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Steady State
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>5.288</b>
COP	-	<b>2.091</b>
Power consumption	kW	<b>2.530</b>
<b>Measured</b>		
Heating capacity	kW	5.318
COP	-	2.072
Power consumption	kW	2.566
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	-7.00
Air temperature wet bulb	°C	-8.14
Air_outlet temperature dry bulb	°C	-9.35
Water_inlet temperature	°C	46.97
water_outlet temperature	°C	55.11
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	47674
Calculated Hydraulic power	W	8
Calculated global efficiency	$\eta$	0.21
Calculated Capacity correction	W	29
Calculated Power correction	W	37
Water Flow	m <sup>3</sup> /s	0.000158





## Detailed test results for rating condition – quiet mode – EN 14511

<b>Detailed result for 'EN14511:2018' A2/W35</b>		
Tested according to:		EN14511:2018
Minimum flow reached:		No
Measurement type:		Transient
Integrated liquid pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Heating capacity	kW	<b>5.090</b>
COP	-	<b>4.015</b>
Power consumption	kW	<b>1.268</b>
<b>Measured</b>		
Heating capacity	kW	5.126
COP	-	3.898
Power consumption	kW	1.315
<b>During heating</b>		
Air_inlet temperature dry bulb	°C	2.09
Air temperature wet bulb	°C	0.84
Air_outlet temperature dry bulb	°C	-2.30
Water_inlet temperature	°C	30.01
water_outlet temperature	°C	35.12
Water_outlet temperature (Time averaged)		
<b>Circulation pump</b>		
Measured external static pressure difference, liquid pump	Pa	41155
Calculated Hydraulic power	W	12
Calculated global efficiency	$\eta$	0.24
Calculated Capacity correction	W	36
Calculated Power correction	W	47
Water Flow	m <sup>3</sup> /s	0.000279



## Detailed SEER test result – fan coil application – EN 14825

<b>Detailed result for 'EN14825:2018 Cooling fan (A) A35/W7</b>		
Tested according to:	EN14511:2018 and	EN14825:2018
Climate zone:		N/A
Temperature application:		Cooling fan
Condition name:		A
Condition temperature:	°C	35
Part load:	%	100%
Chosen Tbivalent	°C	N/A
Tdesign	°C	35
Pdesign	kW	6.00
Cooling demand:	kW	6.00
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Cooling capacity	kW	<b>5.721</b>
EER	-	<b>3.327</b>
Power consumption	kW	<b>1.720</b>
<b>Measured</b>		
Cooling capacity	kW	5.686
EER	-	3.221
Power consumption	kW	1.766
<b>During cooling</b>		
Air_inter temperature dry bulb	°C	35.05
Air_outlet temperature dry bulb	°C	41.56
Water_Inlet temperature	°C	12.00
Water_outlet temperature	°C	7.04
Water_outlet temperature (Time averaged)	°C	<b>7.04</b>
<b>Circulation pump</b>		
Measured: Static differential pressure, liquid pump	Pa	39940
Calculated Hydraulic power	W	11
Calculated global efficiency	η	0.24
Calculated Capacity correction	W	35
Calculated Power correction	W	46
Water Flow	m <sup>3</sup> /s	0.000274



<b>Detailed result for 'EN14825:2018 Cooling fan (B) A30/W8.5</b>		
Tested according to:	EN14511:2018 and	EN14825:2018
Climate zone:		N/A
Temperature application:		Cooling fan
Condition name:		B
Condition temperature:	°C	30
Part load:	%	74%
Chosen Tbivalent	°C	N/A
Tdesign	°C	35
Pdesign	kW	6.00
Cooling demand:	kW	4.44
CR:	-	1.0
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Cooling capacity	kW	<b>4.297</b>
EER	-	<b>4.452</b>
Power consumption	kW	<b>0.965</b>
<b>Measured</b>		
Cooling capacity	kW	4.265
EER	-	4.240
Power consumption	kW	1.006
<b>During cooling</b>		
Air_inter temperature dry bulb	°C	30.01
Air_outlet temperature dry bulb	°C	35.26
Water_Inlet temperature	°C	13.51
Water_outlet temperature	°C	8.54
Water_outlet temperature (Time averaged)	°C	<b>8.54</b>
<b>Circulation pump</b>		
Measured: Static differential pressure, liquid pump	Pa	43766
Calculated Hydraulic power	W	9
Calculated global efficiency	η	0.22
Calculated Capacity correction	W	32
Calculated Power correction	W	41
Water Flow	m <sup>3</sup> /s	0.000205



<b>Detailed result for 'EN14825:2018 Cooling fan (C) A25/W10</b>		
Tested according to:	EN14511:2018 and	EN14825:2018
Climate zone:		N/A
Temperature application:		Cooling fan
Condition name:		C
Condition temperature:	°C	25
Part load:	%	47%
Chosen Tbivalent	°C	N/A
Tdesign	°C	35
Pdesign	kW	6.00
Cooling demand:	kW	2.82
CR:	-	0.9
Minimum flow reached:	-	No
Measurement type:		Steady State
Integrated circulation pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Cooling capacity	kW	<b>3.180</b>
EER	-	<b>6.947</b>
Power consumption	kW	<b>0.458</b>
<b>Measured</b>		
Cooling capacity	kW	3.152
EER	-	6.403
Power consumption	kW	0.492
<b>During cooling</b>		
Air_inter temperature dry bulb	°C	25.00
Air_outlet temperature dry bulb	°C	30.88
Water_Inlet temperature	°C	14.51
Water_outlet temperature	°C	9.48
Water_outlet temperature (Time averaged)	°C	<b>10.05</b>
<b>Circulation pump</b>		
Measured: Static differential pressure, liquid pump	Pa	45393
Calculated Hydraulic power	W	7
Calculated global efficiency	η	0.20
Calculated Capacity correction	W	28
Calculated Power correction	W	35
Water Flow	m <sup>3</sup> /s	0.000150




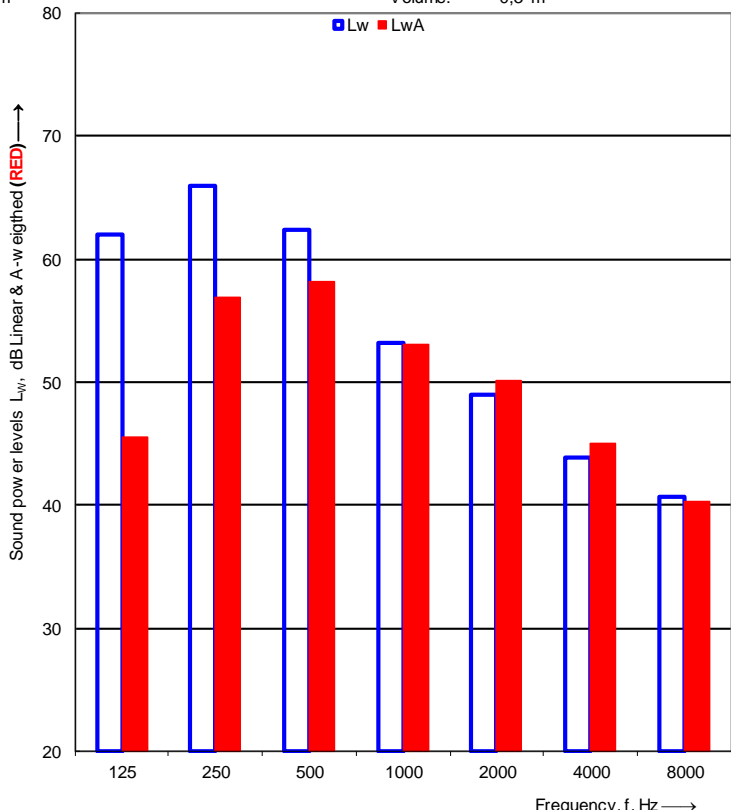


<b>Detailed result for 'EN14825:2018 Cooling fan (D) A20/W11.5</b>		
Tested according to:	EN14511:2018 and	EN14825:2018
Climate zone:		N/A
Temperature application:		Cooling fan
Condition name:		D
Condition temperature:	°C	20
Part load:	%	21%
Chosen Tbivalent	°C	N/A
Tdesign	°C	35
Pdesign	kW	6.00
Cooling demand:	kW	1.26
CR:	-	0.5
Minimum flow reached:	-	Yes
Measurement type:		Steady State
Integrated circulation pump:		Yes
Integrated liquid pump able to generate a positive ext. static pressure difference:		Yes
<b>Included corrections (Final result)</b>		
Cooling capacity	kW	<b>2.650</b>
EER	-	<b>6.922</b>
Power consumption	kW	<b>0.383</b>
<b>Measured</b>		
Cooling capacity	kW	2.624
EER	-	6.320
Power consumption	kW	0.415
<b>During cooling</b>		
Air_inter temperature dry bulb	°C	20.00
Air_outlet temperature dry bulb	°C	28.97
Water_Inlet temperature	°C	13.74
Water_outlet temperature	°C	9.03
Water_outlet temperature (Time averaged)	°C	<b>11.50</b>
<b>Circulation pump</b>		
Measured: Static differential pressure, liquid pump	Pa	45802
Calculated Hydraulic power	W	6
Calculated global efficiency	η	0.19
Calculated Capacity correction	W	26
Calculated Power correction	W	32
Water Flow	m <sup>3</sup> /s	0.000133






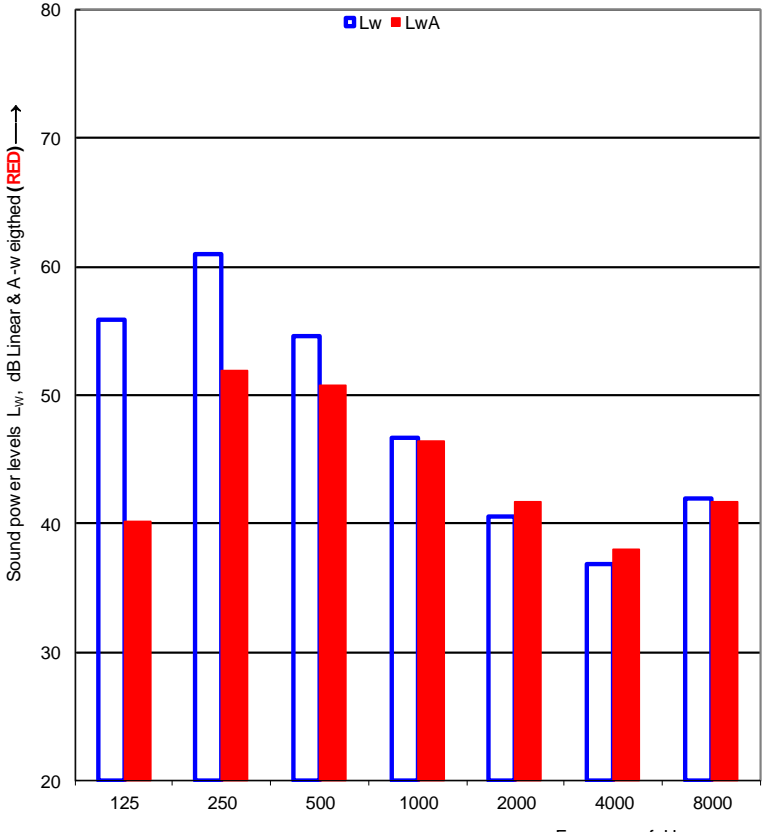
## Detailed test results of sound power measurement

### Test N#1

 		Sound power levels according to ISO 3743-1:2010		 <b>TEKNOLOGISK INSTITUT</b>																																																					
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																									
Client:		Panasonic Marketing Europe GmbH		Date of test: 06-09-2023																																																					
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																							
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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: 54[Hz], Fan speed: 570[rpm], Heating capacity: 7.1 [kW], Power_input: 1.42 [kW], Water flow rate: 1250 [l/h], dp_water: 390 [mbar]																																																							
Static pressure:		1024 kPa		<u>Reference box:</u>																																																					
Air temperature:		7,0 °C		L1: 0,9 m																																																					
Relative air humidity:		84,0 %		L2: 0,4 m																																																					
Test room volume:		102,8 m³		L3: 0,8 m																																																					
Area, S, of test room:		138,9 m²		Volume: 0,3 m³																																																					
Room:		Room 2																																																							
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>58,5</td><td rowspan="3">61,9</td></tr><tr><td>125</td><td>57,6</td></tr><tr><td>160</td><td>54,5</td></tr><tr><td>200</td><td>63,4</td><td rowspan="3">65,9</td></tr><tr><td>250</td><td>58,5</td></tr><tr><td>315</td><td>59,9</td></tr><tr><td>400</td><td>61,1</td><td rowspan="3">62,3</td></tr><tr><td>500</td><td>54,9</td></tr><tr><td>630</td><td>50,5</td></tr><tr><td>800</td><td>49,9</td><td rowspan="3">53,2</td></tr><tr><td>1000</td><td>47,7</td></tr><tr><td>1250</td><td>47,1</td></tr><tr><td>1600</td><td>46,0</td><td rowspan="3">49,0</td></tr><tr><td>2000</td><td>43,6</td></tr><tr><td>2500</td><td>42,0</td></tr><tr><td>3150</td><td>42,0</td><td rowspan="3">43,9</td></tr><tr><td>4000</td><td>37,2</td></tr><tr><td>5000</td><td>35,4</td></tr><tr><td>6300</td><td>39,1</td><td rowspan="3">40,7</td></tr><tr><td>8000</td><td>34,6</td></tr><tr><td>10000</td><td>28,6</td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	58,5	61,9	125	57,6	160	54,5	200	63,4	65,9	250	58,5	315	59,9	400	61,1	62,3	500	54,9	630	50,5	800	49,9	53,2	1000	47,7	1250	47,1	1600	46,0	49,0	2000	43,6	2500	42,0	3150	42,0	43,9	4000	37,2	5000	35,4	6300	39,1	40,7	8000	34,6	10000	28,6				
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																							
100	58,5	61,9																																																							
125	57,6																																																								
160	54,5																																																								
200	63,4	65,9																																																							
250	58,5																																																								
315	59,9																																																								
400	61,1	62,3																																																							
500	54,9																																																								
630	50,5																																																								
800	49,9	53,2																																																							
1000	47,7																																																								
1250	47,1																																																								
1600	46,0	49,0																																																							
2000	43,6																																																								
2500	42,0																																																								
3150	42,0	43,9																																																							
4000	37,2																																																								
5000	35,4																																																								
6300	39,1	40,7																																																							
8000	34,6																																																								
10000	28,6																																																								
<sup>1</sup> Diff. to backgr. noise < 6dB																																																									
Sound power level L <sub>w</sub> (A):		61,8 dB [re 1pW]																																																							
Name of test institute:		DTI		Date: 06-09-2023																																																					
No. of test report:		300-KLAB-23-010																																																							
Measurements are in full conformity with ISO 3743																																																									






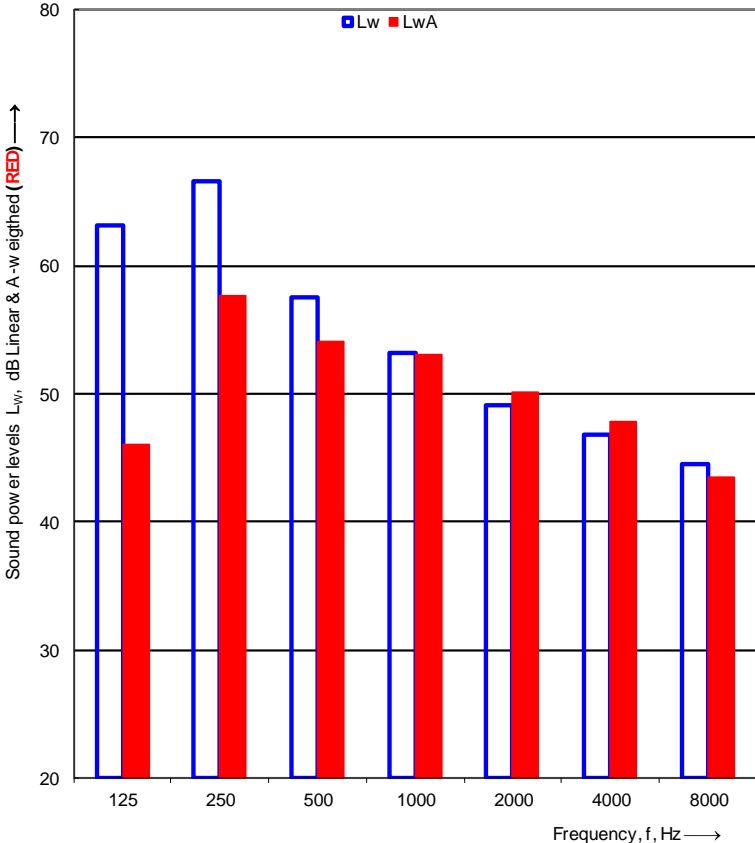
## Test N#2

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 06-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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: 36[Hz], Fan speed: 420[rpm], Heating capacity: 4.8 [kW], Power_input: 0.93 [kW], Water flow rate: 850 [l/h], dp_water: 440 [mbar]																																																																					
Static pressure:		1024 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
Room:		Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>52.2</td><td></td></tr><tr><td>125</td><td>48.7</td><td>55.8</td></tr><tr><td>160</td><td>51.5</td><td></td></tr><tr><td>200</td><td>58.6</td><td></td></tr><tr><td>250</td><td>52.6</td><td>60.9</td></tr><tr><td>315</td><td>55.1</td><td></td></tr><tr><td>400</td><td>52.6</td><td></td></tr><tr><td>500</td><td>47.1</td><td>54.5</td></tr><tr><td>630</td><td>47.0</td><td></td></tr><tr><td>800</td><td>44.0</td><td></td></tr><tr><td>1000</td><td>39.7</td><td>46.6</td></tr><tr><td>1250</td><td>40.5</td><td></td></tr><tr><td>1600</td><td>38.1</td><td></td></tr><tr><td>2000</td><td>34.5</td><td>40.5</td></tr><tr><td>2500</td><td>33.1</td><td></td></tr><tr><td>3150</td><td>35.9</td><td></td></tr><tr><td>4000</td><td>27.3</td><td>36.9</td></tr><tr><td>5000</td><td>26.3</td><td></td></tr><tr><td>6300</td><td>41.0</td><td></td></tr><tr><td>8000</td><td>34.4</td><td>41.9</td></tr><tr><td>10000</td><td>24.6</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	52.2		125	48.7	55.8	160	51.5		200	58.6		250	52.6	60.9	315	55.1		400	52.6		500	47.1	54.5	630	47.0		800	44.0		1000	39.7	46.6	1250	40.5		1600	38.1		2000	34.5	40.5	2500	33.1		3150	35.9		4000	27.3	36.9	5000	26.3		6300	41.0		8000	34.4	41.9	10000	24.6					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	52.2																																																																						
125	48.7	55.8																																																																					
160	51.5																																																																						
200	58.6																																																																						
250	52.6	60.9																																																																					
315	55.1																																																																						
400	52.6																																																																						
500	47.1	54.5																																																																					
630	47.0																																																																						
800	44.0																																																																						
1000	39.7	46.6																																																																					
1250	40.5																																																																						
1600	38.1																																																																						
2000	34.5	40.5																																																																					
2500	33.1																																																																						
3150	35.9																																																																						
4000	27.3	36.9																																																																					
5000	26.3																																																																						
6300	41.0																																																																						
8000	34.4	41.9																																																																					
10000	24.6																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
<b>Sound power level L<sub>w</sub>(A):</b>		<b>55.6 dB [re 1pW]</b>																																																																					
Name of test institute:		DTI		Date: 06-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							






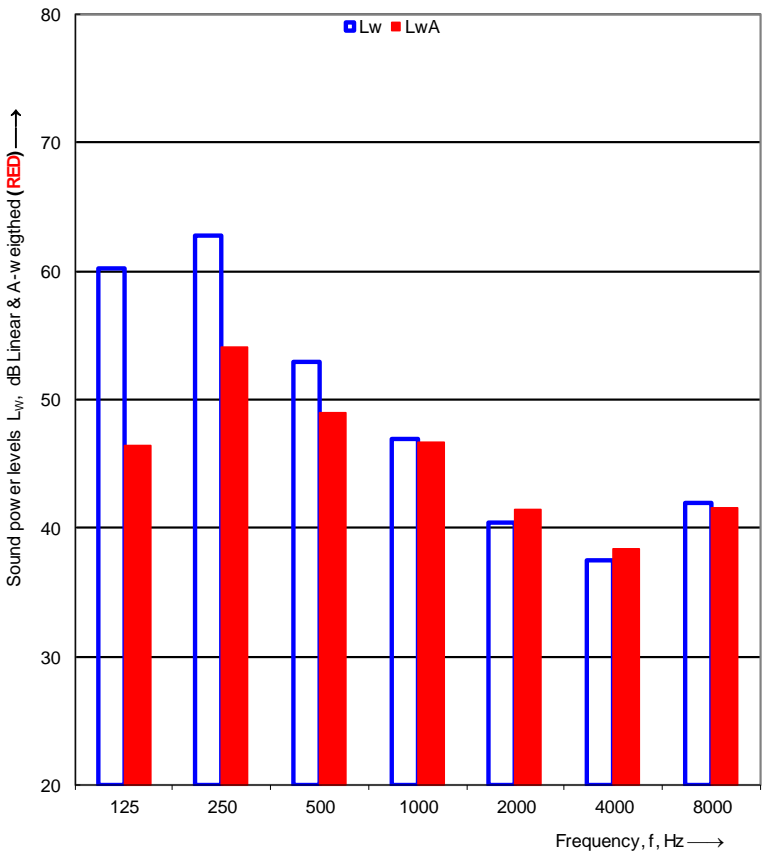


### Test N#3

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 05-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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: 57[Hz], Fan speed: 540[rpm], Heating capacity: 6.6 [kW], Power input: 2.21 [kW], Water flow rate: 720 [l/h], dp_water: 460 [mbar]																																																																					
Static pressure:		1022 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
Room:		Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>60.5</td><td></td></tr><tr><td>125</td><td>58.4</td><td>63.1</td></tr><tr><td>160</td><td>53.3</td><td></td></tr><tr><td>200</td><td>61.1</td><td></td></tr><tr><td>250</td><td>64.5</td><td>66.5</td></tr><tr><td>315</td><td>56.1</td><td></td></tr><tr><td>400</td><td>53.2</td><td></td></tr><tr><td>500</td><td>53.8</td><td>57.5</td></tr><tr><td>630</td><td>50.5</td><td></td></tr><tr><td>800</td><td>49.1</td><td></td></tr><tr><td>1000</td><td>48.2</td><td>53.1</td></tr><tr><td>1250</td><td>47.7</td><td></td></tr><tr><td>1600</td><td>46.9</td><td></td></tr><tr><td>2000</td><td>42.7</td><td>49.0</td></tr><tr><td>2500</td><td>41.0</td><td></td></tr><tr><td>3150</td><td>43.2</td><td></td></tr><tr><td>4000</td><td>41.0</td><td>46.8</td></tr><tr><td>5000</td><td>41.6</td><td></td></tr><tr><td>6300</td><td>40.6</td><td></td></tr><tr><td>8000</td><td>39.2</td><td>44.5</td></tr><tr><td>10000</td><td>39.3</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	60.5		125	58.4	63.1	160	53.3		200	61.1		250	64.5	66.5	315	56.1		400	53.2		500	53.8	57.5	630	50.5		800	49.1		1000	48.2	53.1	1250	47.7		1600	46.9		2000	42.7	49.0	2500	41.0		3150	43.2		4000	41.0	46.8	5000	41.6		6300	40.6		8000	39.2	44.5	10000	39.3					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	60.5																																																																						
125	58.4	63.1																																																																					
160	53.3																																																																						
200	61.1																																																																						
250	64.5	66.5																																																																					
315	56.1																																																																						
400	53.2																																																																						
500	53.8	57.5																																																																					
630	50.5																																																																						
800	49.1																																																																						
1000	48.2	53.1																																																																					
1250	47.7																																																																						
1600	46.9																																																																						
2000	42.7	49.0																																																																					
2500	41.0																																																																						
3150	43.2																																																																						
4000	41.0	46.8																																																																					
5000	41.6																																																																						
6300	40.6																																																																						
8000	39.2	44.5																																																																					
10000	39.3																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
<b>Sound power level L<sub>w</sub>(A):</b>		<b>61.0 dB [re 1pW]</b>																																																																					
Name of test institute:		DTI		Date: 05-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							




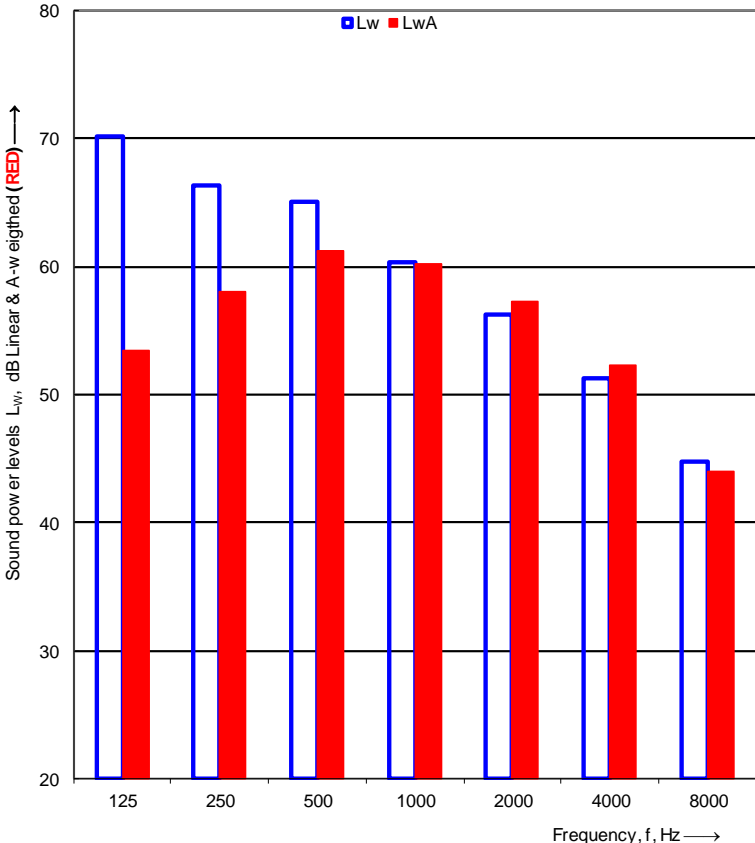


## Test N#4

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 13-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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: 370[rpm], Heating capacity: 4.4 [kW], Power input: 1.46 [kW], Water flow rate: 480 [l/h], dp_water: 480 [mbar]																																																																					
Static pressure:		1024 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
		Room: Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>48.0<sup>1</sup></td><td></td></tr><tr><td>125</td><td>48.0</td><td>60.2</td></tr><tr><td>160</td><td>59.6</td><td></td></tr><tr><td>200</td><td>57.2</td><td></td></tr><tr><td>250</td><td>60.2</td><td>62.7</td></tr><tr><td>315</td><td>54.9</td><td></td></tr><tr><td>400</td><td>51.2</td><td></td></tr><tr><td>500</td><td>44.9</td><td>52.9</td></tr><tr><td>630</td><td>45.1</td><td></td></tr><tr><td>800</td><td>44.0</td><td></td></tr><tr><td>1000</td><td>40.6</td><td>46.9</td></tr><tr><td>1250</td><td>41.0</td><td></td></tr><tr><td>1600</td><td>38.1</td><td></td></tr><tr><td>2000</td><td>33.9</td><td>40.4</td></tr><tr><td>2500</td><td>32.9</td><td></td></tr><tr><td>3150</td><td>34.1</td><td></td></tr><tr><td>4000</td><td>32.6</td><td>37.4</td></tr><tr><td>5000</td><td>30.5</td><td></td></tr><tr><td>6300</td><td>40.7</td><td></td></tr><tr><td>8000</td><td>34.7</td><td>41.9</td></tr><tr><td>10000</td><td>29.4</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	48.0 <sup>1</sup>		125	48.0	60.2	160	59.6		200	57.2		250	60.2	62.7	315	54.9		400	51.2		500	44.9	52.9	630	45.1		800	44.0		1000	40.6	46.9	1250	41.0		1600	38.1		2000	33.9	40.4	2500	32.9		3150	34.1		4000	32.6	37.4	5000	30.5		6300	40.7		8000	34.7	41.9	10000	29.4					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	48.0 <sup>1</sup>																																																																						
125	48.0	60.2																																																																					
160	59.6																																																																						
200	57.2																																																																						
250	60.2	62.7																																																																					
315	54.9																																																																						
400	51.2																																																																						
500	44.9	52.9																																																																					
630	45.1																																																																						
800	44.0																																																																						
1000	40.6	46.9																																																																					
1250	41.0																																																																						
1600	38.1																																																																						
2000	33.9	40.4																																																																					
2500	32.9																																																																						
3150	34.1																																																																						
4000	32.6	37.4																																																																					
5000	30.5																																																																						
6300	40.7																																																																						
8000	34.7	41.9																																																																					
10000	29.4																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
		<b>Sound power level L<sub>w</sub>(A): 56.6 dB [re 1pW]</b>																																																																					
Name of test institute:		DTI		Date: 13-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							




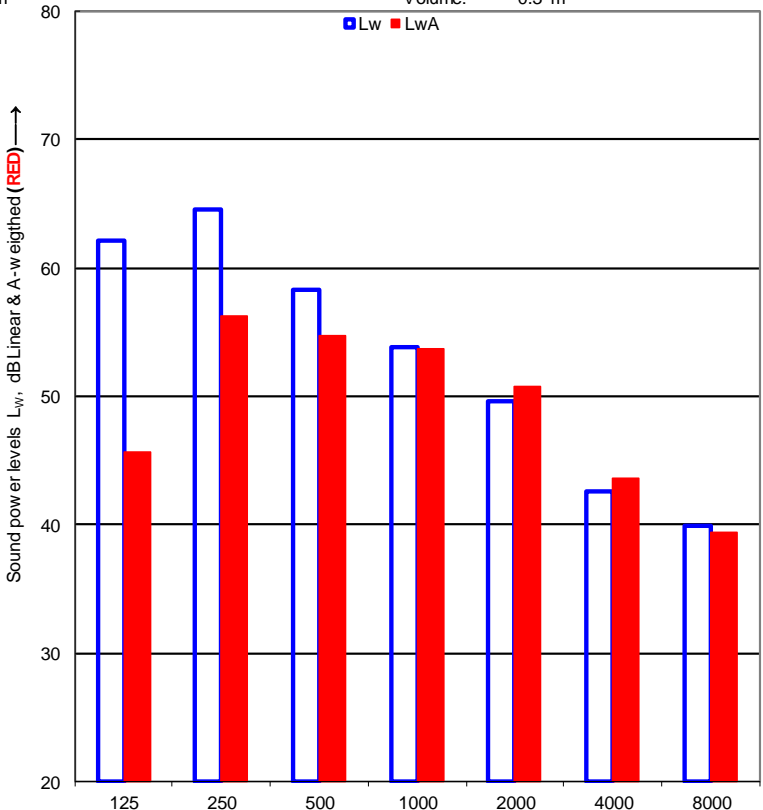


## Test N#5

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 08-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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:		A-7/W35, Compressor speed: 70[rpm], Fan speed: 730[rpm], Heating capacity: 6.0 [kW], Power_input: 1.88 [kW], Water flow rate: 1050 [l/h], dp_water: 400 [mbar]																																																																					
Static pressure:		1022 kPa		Reference box:																																																																			
Air temperature:		-7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		74.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
Room:		Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>68.1</td><td></td></tr><tr><td>125</td><td>62.9</td><td>70.2</td></tr><tr><td>160</td><td>63.0</td><td></td></tr><tr><td>200</td><td>61.3</td><td></td></tr><tr><td>250</td><td>62.0</td><td>66.4</td></tr><tr><td>315</td><td>61.5</td><td></td></tr><tr><td>400</td><td>62.5</td><td></td></tr><tr><td>500</td><td>59.0</td><td>65.0</td></tr><tr><td>630</td><td>57.6</td><td></td></tr><tr><td>800</td><td>56.7</td><td></td></tr><tr><td>1000</td><td>55.1</td><td>60.3</td></tr><tr><td>1250</td><td>54.6</td><td></td></tr><tr><td>1600</td><td>53.1</td><td></td></tr><tr><td>2000</td><td>50.9</td><td>56.2</td></tr><tr><td>2500</td><td>49.4</td><td></td></tr><tr><td>3150</td><td>48.2</td><td></td></tr><tr><td>4000</td><td>46.2</td><td>51.2</td></tr><tr><td>5000</td><td>43.9</td><td></td></tr><tr><td>6300</td><td>42.0</td><td></td></tr><tr><td>8000</td><td>39.4</td><td>44.7</td></tr><tr><td>10000</td><td>37.0</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	68.1		125	62.9	70.2	160	63.0		200	61.3		250	62.0	66.4	315	61.5		400	62.5		500	59.0	65.0	630	57.6		800	56.7		1000	55.1	60.3	1250	54.6		1600	53.1		2000	50.9	56.2	2500	49.4		3150	48.2		4000	46.2	51.2	5000	43.9		6300	42.0		8000	39.4	44.7	10000	37.0					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	68.1																																																																						
125	62.9	70.2																																																																					
160	63.0																																																																						
200	61.3																																																																						
250	62.0	66.4																																																																					
315	61.5																																																																						
400	62.5																																																																						
500	59.0	65.0																																																																					
630	57.6																																																																						
800	56.7																																																																						
1000	55.1	60.3																																																																					
1250	54.6																																																																						
1600	53.1																																																																						
2000	50.9	56.2																																																																					
2500	49.4																																																																						
3150	48.2																																																																						
4000	46.2	51.2																																																																					
5000	43.9																																																																						
6300	42.0																																																																						
8000	39.4	44.7																																																																					
10000	37.0																																																																						
¹ Diff. to backgr. noise < 6dB																																																																							
Sound power level L <sub>w</sub> (A):		66.0 dB [re 1pW]																																																																					
Name of test institute:		DTI		Date: 08-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							



## Test N#6

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 08-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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:		A-7/W35, Compressor speed: 45[Hz], Fan speed: 570[rpm], Heating capacity: 4.0 [kW], Power_input: 1.2 [kW], Water flow rate: 695 [l/h], dp_water: 450 [mbar]																																																																					
Static pressure:		1022 kPa		<u>Reference box:</u>																																																																			
Air temperature:		-7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		74.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
		Room: Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>58.7</td><td></td></tr><tr><td>125</td><td>57.9</td><td>62.1</td></tr><tr><td>160</td><td>54.5</td><td></td></tr><tr><td>200</td><td>55.8</td><td></td></tr><tr><td>250</td><td>62.5</td><td>64.5</td></tr><tr><td>315</td><td>58.2</td><td></td></tr><tr><td>400</td><td>55.4</td><td></td></tr><tr><td>500</td><td>52.8</td><td>58.3</td></tr><tr><td>630</td><td>51.5</td><td></td></tr><tr><td>800</td><td>50.2</td><td></td></tr><tr><td>1000</td><td>48.5</td><td>53.8</td></tr><tr><td>1250</td><td>48.1</td><td></td></tr><tr><td>1600</td><td>47.1</td><td></td></tr><tr><td>2000</td><td>43.8</td><td>49.6</td></tr><tr><td>2500</td><td>42.1</td><td></td></tr><tr><td>3150</td><td>40.1</td><td></td></tr><tr><td>4000</td><td>37.1</td><td>42.6</td></tr><tr><td>5000</td><td>34.3</td><td></td></tr><tr><td>6300</td><td>38.4</td><td></td></tr><tr><td>8000</td><td>33.4</td><td>39.9</td></tr><tr><td>10000</td><td>27.8</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	58.7		125	57.9	62.1	160	54.5		200	55.8		250	62.5	64.5	315	58.2		400	55.4		500	52.8	58.3	630	51.5		800	50.2		1000	48.5	53.8	1250	48.1		1600	47.1		2000	43.8	49.6	2500	42.1		3150	40.1		4000	37.1	42.6	5000	34.3		6300	38.4		8000	33.4	39.9	10000	27.8					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	58.7																																																																						
125	57.9	62.1																																																																					
160	54.5																																																																						
200	55.8																																																																						
250	62.5	64.5																																																																					
315	58.2																																																																						
400	55.4																																																																						
500	52.8	58.3																																																																					
630	51.5																																																																						
800	50.2																																																																						
1000	48.5	53.8																																																																					
1250	48.1																																																																						
1600	47.1																																																																						
2000	43.8	49.6																																																																					
2500	42.1																																																																						
3150	40.1																																																																						
4000	37.1	42.6																																																																					
5000	34.3																																																																						
6300	38.4																																																																						
8000	33.4	39.9																																																																					
10000	27.8																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
		<b>Sound power level L<sub>w</sub>(A): 60.6 dB [re 1pW]</b>																																																																					
Name of test institute:		DTI		Date: 08-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							

## Test N#7



## 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:	Panasonic Marketing Europe GmbH	Date of test:	08-09-2023
Object:	Type: Air to water heat pump Model: WH-UDZ07KE5		
Mounting conditions:	The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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: A-7/W55, Compressor speed: 70[Hz], Fan speed: 730[rpm], Heating capacity: 5.3 [kW], Power input: 1.6 [kW], Water flow rate: 570 [l/h], dp\_water: 470 [mbar]

Static pressure:	1022 kPa
------------------	----------

Air temperature: -7.0 °C

Relative air humidity: 74.0 %

Test room volume:	102.8 m <sup>3</sup>
-------------------	----------------------

Area,  $S$ , of test room: 138.9 m<sup>2</sup>

Room: Room 2

Reference box:

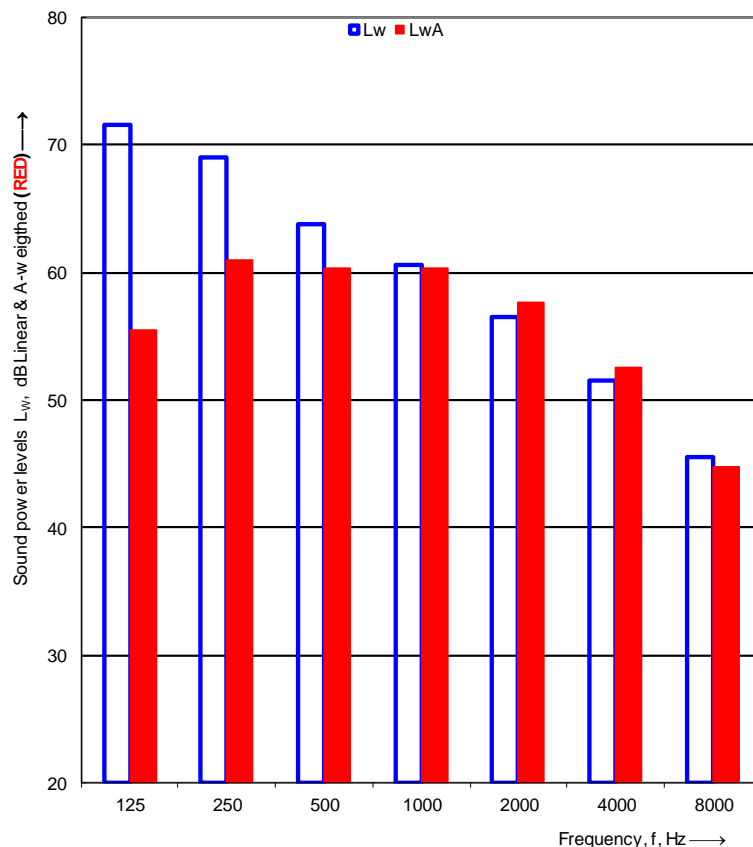
L1: 0.9 m

L2: 0.4 m

L3: 0.8 m

Volume: 0.3 m<sup>3</sup>

Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]
100	68.4	71.6
125	65.4	
160	66.1	
200	61.9	
250	65.6	69.0
315	64.4	
400	60.6	
500	58.0	
630	58.0	63.8
800	57.0	
1000	55.4	
1250	54.5	
1600	53.5	60.5
2000	51.3	
2500	49.6	
3150	48.0	
4000	46.8	56.5
5000	44.8	
6300	42.4	
8000	40.5	
10000	38.6	51.5
		45.5

<sup>1</sup> Diff. to backgr. noise < 6dB

**Sound power level  $L_W(A)$ :**      **66.6 dB [re 1pW]**




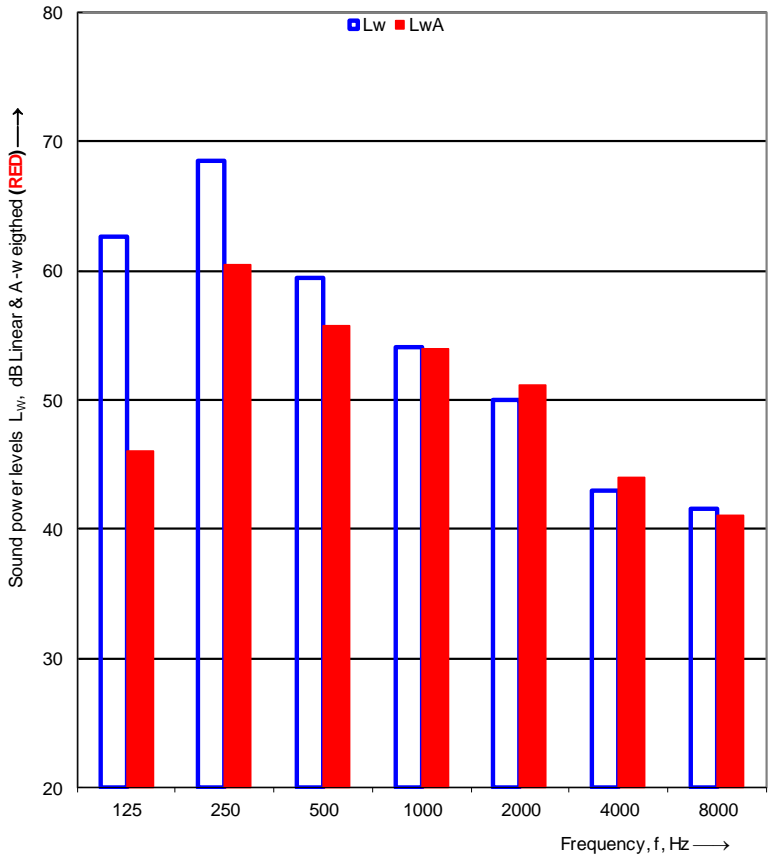
Name of test institute:	DTI
<b>No. of test report:</b>	300-KLAB-23-010

Date: 08-09-2023

Measurements are in full conformity with ISO 3743




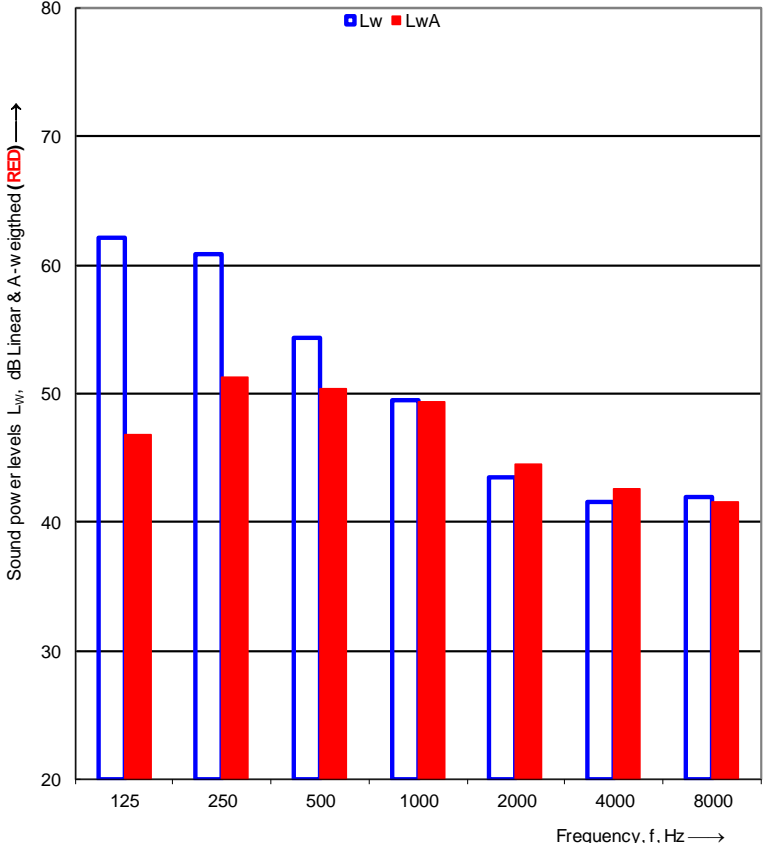


## Test N#8

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 08-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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:		A-7/W55, Compressor speed: 45[Hz], Fan speed: 570[rpm], Heating capacity: 3.4 [kW], Power_input: 1.6 [kW], Water flow rate: 480 [l/h], dp_water: 470 [mbar]																																																																					
Static pressure:		1022 kPa		<u>Reference box:</u>																																																																			
Air temperature:		-7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		74.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
		Room: Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>59.9</td><td></td></tr><tr><td>125</td><td>57.4</td><td>62.6</td></tr><tr><td>160</td><td>54.9</td><td></td></tr><tr><td>200</td><td>55.4</td><td></td></tr><tr><td>250</td><td>67.1</td><td>68.5</td></tr><tr><td>315</td><td>62.2</td><td></td></tr><tr><td>400</td><td>56.8</td><td></td></tr><tr><td>500</td><td>54.4</td><td>59.5</td></tr><tr><td>630</td><td>51.2</td><td></td></tr><tr><td>800</td><td>50.7</td><td></td></tr><tr><td>1000</td><td>48.7</td><td>54.1</td></tr><tr><td>1250</td><td>48.0</td><td></td></tr><tr><td>1600</td><td>47.3</td><td></td></tr><tr><td>2000</td><td>44.6</td><td>50.0</td></tr><tr><td>2500</td><td>42.3</td><td></td></tr><tr><td>3150</td><td>40.3</td><td></td></tr><tr><td>4000</td><td>37.6</td><td>43.0</td></tr><tr><td>5000</td><td>35.2</td><td></td></tr><tr><td>6300</td><td>40.1</td><td></td></tr><tr><td>8000</td><td>34.6</td><td>41.5</td></tr><tr><td>10000</td><td>30.3</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	59.9		125	57.4	62.6	160	54.9		200	55.4		250	67.1	68.5	315	62.2		400	56.8		500	54.4	59.5	630	51.2		800	50.7		1000	48.7	54.1	1250	48.0		1600	47.3		2000	44.6	50.0	2500	42.3		3150	40.3		4000	37.6	43.0	5000	35.2		6300	40.1		8000	34.6	41.5	10000	30.3					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	59.9																																																																						
125	57.4	62.6																																																																					
160	54.9																																																																						
200	55.4																																																																						
250	67.1	68.5																																																																					
315	62.2																																																																						
400	56.8																																																																						
500	54.4	59.5																																																																					
630	51.2																																																																						
800	50.7																																																																						
1000	48.7	54.1																																																																					
1250	48.0																																																																						
1600	47.3																																																																						
2000	44.6	50.0																																																																					
2500	42.3																																																																						
3150	40.3																																																																						
4000	37.6	43.0																																																																					
5000	35.2																																																																						
6300	40.1																																																																						
8000	34.6	41.5																																																																					
10000	30.3																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
<b>Sound power level L<sub>w</sub>(A):</b>		<b>62.8 dB [re 1pW]</b>																																																																					
Name of test institute:		DTI		Date: 08-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							




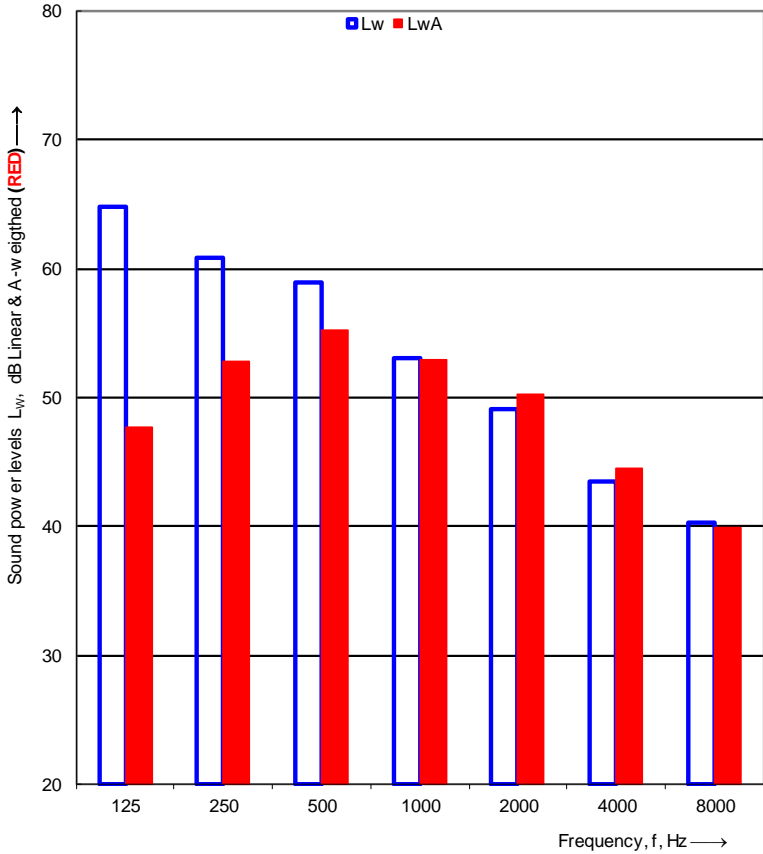


Test N#9

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 05-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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: 26[Hz], Fan speed: 450[rpm], Heating capacity: 2.7 [kW], Power_input: 1.12 [kW], Water flow rate: 480 [l/h], dp_water: 480 [mbar]																																																																					
Static pressure:		1022 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
		Room: Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>58.7</td><td></td></tr><tr><td>125</td><td>51.1</td><td>62.2</td></tr><tr><td>160</td><td>58.9</td><td></td></tr><tr><td>200</td><td>58.9</td><td></td></tr><tr><td>250</td><td>54.7</td><td>60.8</td></tr><tr><td>315</td><td>51.2</td><td></td></tr><tr><td>400</td><td>52.2</td><td></td></tr><tr><td>500</td><td>48.5</td><td>54.3</td></tr><tr><td>630</td><td>45.0</td><td></td></tr><tr><td>800</td><td>46.3</td><td></td></tr><tr><td>1000</td><td>43.9</td><td>49.5</td></tr><tr><td>1250</td><td>43.5</td><td></td></tr><tr><td>1600</td><td>40.6</td><td></td></tr><tr><td>2000</td><td>37.1</td><td>43.4</td></tr><tr><td>2500</td><td>37.3</td><td></td></tr><tr><td>3150</td><td>36.6</td><td></td></tr><tr><td>4000</td><td>37.8</td><td>41.6</td></tr><tr><td>5000</td><td>35.8</td><td></td></tr><tr><td>6300</td><td>40.7</td><td></td></tr><tr><td>8000</td><td>34.9</td><td>41.9</td></tr><tr><td>10000</td><td>27.8</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	58.7		125	51.1	62.2	160	58.9		200	58.9		250	54.7	60.8	315	51.2		400	52.2		500	48.5	54.3	630	45.0		800	46.3		1000	43.9	49.5	1250	43.5		1600	40.6		2000	37.1	43.4	2500	37.3		3150	36.6		4000	37.8	41.6	5000	35.8		6300	40.7		8000	34.9	41.9	10000	27.8					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	58.7																																																																						
125	51.1	62.2																																																																					
160	58.9																																																																						
200	58.9																																																																						
250	54.7	60.8																																																																					
315	51.2																																																																						
400	52.2																																																																						
500	48.5	54.3																																																																					
630	45.0																																																																						
800	46.3																																																																						
1000	43.9	49.5																																																																					
1250	43.5																																																																						
1600	40.6																																																																						
2000	37.1	43.4																																																																					
2500	37.3																																																																						
3150	36.6																																																																						
4000	37.8	41.6																																																																					
5000	35.8																																																																						
6300	40.7																																																																						
8000	34.9	41.9																																																																					
10000	27.8																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
<div>Sound power level L<sub>w</sub>(A): <b>56.4 dB [re 1pW]</b></div>																																																																							
Name of test institute:		DTI		Date: 05-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							



Test N#10

 		<b>Sound power levels according to ISO 3743-1:2010</b>		 <b>TEKNOLOGISK INSTITUT</b>																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 08-09-2023																																																																			
Object:		Type: Air to water heat pump Model: WH-UDZ07KE5																																																																					
Mounting conditions:		The outdoor unit is mounted on the supporting metal support frame using four vibration damping insulators. The support is placed 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:		A2/W35, Compressor speed: 54[Hz], Fan speed: 550[rpm], Heating capacity: 6.1 [kW], Power_input: 1.43 [kW], Water flow rate: 1005 [l/h], dp_water: 415 [mbar]																																																																					
Static pressure:		1022 kPa		<u>Reference box:</u>																																																																			
Air temperature:		2.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		85.0 %		L2: 0.4 m																																																																			
Test room volume:		102.8 m³		L3: 0.8 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.3 m³																																																																			
Room:		Room 2																																																																					
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L<sub>w</sub> 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>62.1</td><td></td></tr><tr><td>125</td><td>60.6</td><td>64.8</td></tr><tr><td>160</td><td>53.6</td><td></td></tr><tr><td>200</td><td>55.3</td><td></td></tr><tr><td>250</td><td>56.2</td><td>60.9</td></tr><tr><td>315</td><td>56.7</td><td></td></tr><tr><td>400</td><td>56.1</td><td></td></tr><tr><td>500</td><td>54.1</td><td>58.9</td></tr><tr><td>630</td><td>50.7</td><td></td></tr><tr><td>800</td><td>49.2</td><td></td></tr><tr><td>1000</td><td>47.8</td><td>53.0</td></tr><tr><td>1250</td><td>47.5</td><td></td></tr><tr><td>1600</td><td>46.2</td><td></td></tr><tr><td>2000</td><td>43.6</td><td>49.1</td></tr><tr><td>2500</td><td>42.0</td><td></td></tr><tr><td>3150</td><td>41.4</td><td></td></tr><tr><td>4000</td><td>37.4</td><td>43.5</td></tr><tr><td>5000</td><td>34.7</td><td></td></tr><tr><td>6300</td><td>38.7</td><td></td></tr><tr><td>8000</td><td>34.4</td><td>40.3</td></tr><tr><td>10000</td><td>27.7</td><td></td></tr></tbody></table>		Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]	100	62.1		125	60.6	64.8	160	53.6		200	55.3		250	56.2	60.9	315	56.7		400	56.1		500	54.1	58.9	630	50.7		800	49.2		1000	47.8	53.0	1250	47.5		1600	46.2		2000	43.6	49.1	2500	42.0		3150	41.4		4000	37.4	43.5	5000	34.7		6300	38.7		8000	34.4	40.3	10000	27.7					
Frequency f [Hz]	L <sub>w</sub> 1/3 octave [dB]	1/1 oct [dB]																																																																					
100	62.1																																																																						
125	60.6	64.8																																																																					
160	53.6																																																																						
200	55.3																																																																						
250	56.2	60.9																																																																					
315	56.7																																																																						
400	56.1																																																																						
500	54.1	58.9																																																																					
630	50.7																																																																						
800	49.2																																																																						
1000	47.8	53.0																																																																					
1250	47.5																																																																						
1600	46.2																																																																						
2000	43.6	49.1																																																																					
2500	42.0																																																																						
3150	41.4																																																																						
4000	37.4	43.5																																																																					
5000	34.7																																																																						
6300	38.7																																																																						
8000	34.4	40.3																																																																					
10000	27.7																																																																						
<sup>1</sup> Diff. to backgr. noise < 6dB																																																																							
<b>Sound power level L<sub>w</sub>(A):</b>		<b>59.6 dB [re 1pW]</b>																																																																					
Name of test institute:		DTI		Date: 08-09-2023																																																																			
No. of test report:		300-KLAB-23-010																																																																					
Measurements are in full conformity with ISO 3743																																																																							





## Appendix 1: Test Procedure

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

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

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

The final total A-weighted sound power level is based on measurements and calculations in 1/3-octave levels, which then are summed into 1/1-octave levels. The uncertainty is estimated on the weighted standard deviations in 1/1-octave levels.

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

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

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

