

TEST REPORT

Report no.:
300-KLAB-16-012



**DANISH
TECHNOLOGICAL
INSTITUTE**

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

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Init:HSG/MDKF/KAMA/JGW
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Customer: Contact person: Thomas Gross
Company: Panasonic DE GmbH
Address: Hagenauer Strasse 43
City: 65203 Wiesbaden
Tel.: +49 1724 141441

Component: Brand: Panasonic
Type: Air to water heat pump
Model: Indoor SXC09H3E5/ Outdoor UX09HE5
Series no.: 55188 & 56199
Production year: N.a.

Dates: Components tested: May + August 2017

Procedure: Test procedure according to EHPA Air/Water Heat Pumps v. 2.3 and EN 14511:2013, part 1, 2 and 3.

Remarks: The unit was delivered by the customer. Installation and setting of the unit's control system were done according to the manufacturer's instructions. The unit was delivered as model no. WH-SXC12H6E5 & WH-UX12HE5, cf. the rating plates of the units. By changing the software, the unit was changed to model no. SXC09H3E5 & UX09HE5.

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

Date: 2017.09.01

Signature: Henning S. Grindorf
B.TecMan & MarEng.



Test Reg. nr. 300



Objective

The objective of this report is to document the following:

- Nominal performance test according to EN 14511 for the determination of the heating capacity and COP.
- The Seasonal Coefficient of Performance (SCOP) according to EN 14825:2016. In order to calculate the SCOP, tests were carried out at the part load conditions stated in the table below.
- The sound power level of the unit at test conditions given in the EHPA Test Regulation version 2.3 for an air to water heat pump as well as two additional measurements, i.e. one measurement with quiet mode level 3 and one measurement with an outlet water temperature of 35°C.

The measurement of the sound power level is performed according to EN 12102, using the Class A method. ISO 3743-1 is the basic method of carrying out sound power measurements. The method is briefly described in appendix 1. For a more detailed description, please view the accreditation papers DANAK-300 (in Danish only). The sound power level is not measured for the indoor unit as the compressor is not part of this.

- The operating range stated by the manufacturer. The test conditions are specified in the EHPA Test Regulation version 2.3 for an air to water heat pump.
- Four safety tests according to EHPA Test Regulation version 2.3.
- Extra test points (not included in the EHPA Test Regulation) according to EN 14511.





Test conditions for nominal performance test

Temperature application	N°	Test condition	Heat source		Heat sink	
			Inlet dry bulb temperature (°C)	Inlet wet bulb temperature (°C)	Inlet temperature (°C)	Outlet temperature (°C)
Low temperature	1	A7/W35	7	6	30	35
	2	A2/W35	2	1	*	35
Medium temperature	3	A7/W55	7	6	47	55

- Nominal performance test n° 1 is required to determine the water flow rate for seasonal performance tests at low temperature application
- Nominal performance test n° 2 is required to fulfil the minimum COP requirement of the EHPA Quality Label
- Nominal performance test n° 3 is required to determine the water flow rate for seasonal performance tests at medium temperature application



Test conditions for low temperature application at reference heating seasons

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

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

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

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

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

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

Additional information

Climate	T _{designh} [°C]	T _{bivalent} [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-10	-10	Variable	Variable



Test conditions for medium temperature application at reference heating seasons

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

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

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

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

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

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

Additional information

Climate	T _{designh} [°C]	T _{bivalent} [°C]	TOL [°C]	Outlet temperature	Flow rate
Average	-10	-10	-10	Variable	Variable



Test conditions for sound power measurements

	Test condition	Heat pump setting		
N°	Temperature air/water [°C]	Compressor speed [Hz]	Heating capacity [kW]	Water flow rate [l/h]
1	A7/W35	35-36	9.22	1539
2	A7/W55	40-41	9.14	998
3*	A7/W55	29-30	4.2	730

*Quiet mode level 3

Test conditions for testing of the operating range

N°	Air inlet dry bulb temperature (°C)	Outlet water temperature (°C)	Water flow rate (l/h)
1	35	55	1539
2	-20	55	1541
3	-20	25	761

Test conditions for safety tests

1	Shutting of the heat transfer medium flows (EN 14511-4 clause 4.4)
2	Complete power supply failure (EN 14511-4 clause 4.5)
3	Condensate draining and enclosure sweat test (EN 14511-4 clause 4.6)
4	Defrosting (EN 14511-4 clause 4.7)

Test conditions for extra test points

N°	Inlet dry bulb air temperature (°C)	Inlet wet bulb air temperature (°C)	Inlet water temperature (°C)	Outlet water temperature (°C)
1	7	6	40	45
2	2	1	*	45
3*	2	1	30	35
4	-7	-8	30	35
5	-25	-	30	35

*Part load with the same water flow rate as the nominal performance test n°1



Main test results for low temperature application at reference heating season average

Model (indoor + outdoor)	Indoor: SXC09H3E5/ Outdoor: UX09HE5
Air-to-water heat pump	Y
Low-temperature heat pump	N
Equipped with supplementary heater	Y
Heat pump combination heater	N

Rated heat output¹⁾	Prated	9.27 kW
Seasonal space heating energy efficiency	η_s	195.3%
	SCOP	4.96

Measured capacity for heating for part load at outdoor temperature T_j	Average climate - Low temperature application	$T_j = -7\text{ °C}$	Pdh	8.62 kW
		$T_j = 2\text{ °C}$	Pdh	5.11 kW
		$T_j = 7\text{ °C}$	Pdh	6.00 kW
		$T_j = 12\text{ °C}$	Pdh	7.09 kW
		$T_j = \text{bivalent temperature}$	Pdh	9.27 kW
		$T_j = \text{operation limit}$	Pdh	9.27 kW

Measured coefficient of performance at outdoor temperature T_j	Average climate - Low temperature application	$T_j = -7\text{ °C}$	COPd	3.23
		$T_j = 2\text{ °C}$	COPd	4.88
		$T_j = 7\text{ °C}$	COPd	6.21
		$T_j = 12\text{ °C}$	COPd	7.94
		$T_j = \text{bivalent temperature}$	COPd	2.87
		$T_j = \text{operation limit}$	COPd	2.87

Bivalent temperature	Tbivalent	-10 °C
Operation limit temperatures	TOL	-10 °C
	WTOL	35 °C
Degradation coefficient²⁾	Cdh	1

Power consumption in modes other than active mode	Off mode	P _{OFF}	0.008 kW
	Thermostat-off mode	P _{TO}	0.000 kW
	Standby mode	P _{SB}	0.008 kW
	Crankcase heater mode	P _{CK}	0.008 kW
Supplementary heater¹⁾	Rated heat output	P _{SUP}	- kW
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q _{HE}	3862 kWh

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

²⁾Determined by measurements



Main test results for medium temperature application at reference heating season average

Model (indoor + outdoor)	Indoor: SXC09H3E5/ Outdoor: UX09HE5
Air-to-water heat pump	Y
Low-temperature heat pump	N
Equipped with supplementary heater	Y
Heat pump combination heater	N

Rated heat output¹⁾	Prated	8.65 kW
Seasonal space heating energy efficiency	η_s	135.1%
	SCOP	3.45

Measured capacity for heating for part load at outdoor temperature Tj	Average climate - Medium temperature application	Tj=-7 °C	Pdh	7.76 kW
		Tj=2 °C	Pdh	4.78 kW
		Tj=7 °C	Pdh	5.31 kW
		Tj=12 °C	Pdh	6.61 kW
		Tj=bivalent temperature	Pdh	8.65 kW
		Tj=operation limit	Pdh	8.65 kW

Measured coefficient of performance at outdoor temperature Tj	Average climate - Medium temperature application	Tj=-7 °C	COPd	2.23
		Tj=2 °C	COPd	3.33
		Tj=7 °C	COPd	4.42
		Tj=12 °C	COPd	5.97
		Tj=bivalent temperature	COPd	1.95
		Tj=operation limit	COPd	1.95

Bivalent temperature	Tbivalent	-10 °C
Operation limit temperatures	TOL	-10 °C
	WTOL	35 °C
Degradation coefficient²⁾	Cdh	1

Power consumption in modes other than active mode	Off mode	P _{OFF}	0.008 kW
	Thermostat-off mode	P _{TO}	0.000 kW
	Standby mode	P _{SB}	0.008 kW
	Crankcase heater mode	P _{CK}	0.008 kW
Supplementary heater¹⁾	Rated heat output	P _{SUP}	- kW
	Type of energy input		Electrical

Other items	Capacity control		Variable
	Water flow control		Variable
	Water flow rate		-
	Annual energy consumption	Q _{HE}	5175 kWh

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

²⁾Determined by measurements



SCOP calculation for low temperature and average climate conditions

Calculation of reference SCOP (heating only)

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

Where

P_{design} = Heating load of the building at design temperature, kW

H_{he} = Number of equivalent heating hours (1400), 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 calculation

	Outdoor air	Part load ratio	Part load	Measured capacity	COP at measured capacity COP _m	Degradation coefficient C _d	Capacity ratio CR	COP at part load COP _{pl}
	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]
A	-7	88	8.20	8.62	3.23	1.00	1.00	3.23
B	2	54	4.99	5.11	4.88	1.00	1.00	4.88
C	7	35	3.21	6.00	6.21	1.00	0.53	6.21
D	12	15	1.43	7.09	7.94	1.00	0.20	7.94
E(TOL)	-10	100	9.27	9.27	2.87	1.00	1.00	2.87
F(Bivalent)	-10	100	9.27	9.27	2.87	1.00	1.00	2.87

	Hours	Power input measured	Power input applied for SCOP calculation	Annual energy input
	[h]	[W]	[W]	[kWh]
Thermostat Off mode	178	0	0	0.00
Off mode	3672	8	8	29.38
Crankcase Heater	3850	8	0	0.00
Standby mode	0	8	8	0.00
			Total	29.38

Note: Prior to the SCOP calculation, the power consumption during standby mode is deducted from the crankcase heater mode, according to EN14825:2016.



Calculation of SCOP

	Outdoor temperature (dry bulb)	Hours	Heat demand	Heat demand covered by heat pump	Electrical back up heater	COP(pl)	Annual heat demand	Annual energy input including electrical back up heater
	Tj	hj	Ph(Tj)		elbu(Tj)		hj x Ph(Tj)	
	[°C]	[h]	[kW]	[kW]	[kW]	[-]	[kWh]	[kWh]
E(TOL) and F(biva	-10	1	9.27	9.27	0.00	2.87	9.27	3.23
	-9	25	8.91	8.91	0.00	2.99	222.84	74.53
	-8	23	8.56	8.56	0.00	3.11	196.81	63.28
A	-7	24	8.20	8.20	0.00	3.23	196.81	60.93
	-6	27	7.84	7.84	0.00	3.41	211.78	62.05
	-5	68	7.49	7.49	0.00	3.60	509.14	141.56
	-4	91	7.13	7.13	0.00	3.78	648.90	171.67
	-3	89	6.77	6.77	0.00	3.96	602.91	152.12
	-2	165	6.42	6.42	0.00	4.15	1058.92	255.37
	-1	173	6.06	6.06	0.00	4.33	1048.58	242.17
	0	240	5.70	5.70	0.00	4.51	1369.11	303.35
	1	280	5.35	5.35	0.00	4.70	1497.46	318.83
B	2	320	4.99	4.99	0.00	4.88	1597.29	327.31
	3	357	4.64	4.64	0.00	5.15	1654.70	321.55
	4	356	4.28	4.28	0.00	5.41	1523.13	281.44
	5	303	3.92	3.92	0.00	5.68	1188.34	209.29
	6	330	3.57	3.57	0.00	5.94	1176.58	197.94
C	7	326	3.21	3.21	0.00	6.21	1046.08	168.45
	8	348	2.85	2.85	0.00	6.56	992.60	151.40
	9	335	2.50	2.50	0.00	6.90	836.08	121.14
	10	315	2.14	2.14	0.00	7.25	673.86	92.97
	11	215	1.78	1.78	0.00	7.59	383.28	50.47
D	12	169	1.43	1.43	0.00	7.94	241.02	30.36
	13	151	1.07	1.07	0.00	8.29	161.51	19.49
	14	105	0.71	0.71	0.00	8.63	74.87	8.67
	15	74	0.36	0.36	0.00	8.98	26.38	2.94
						Total	19148.25	3832.51
							SCOP_on	5.00
							SCOP_ref	4.96



SCOP calculation for medium temperature and average climate conditions

Calculation of reference SCOP (heating only)

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

Where

P_{design} = Heating load of the building at design temperature, kW

H_{he} = Number of equivalent heating hours (1400), 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 calculation

	Outdoor air	Part load ratio	Part load	Measured capacity	COP at measured capacity COP _m	Degradation coefficient Cd	Capacity ratio CR	COP at part load COP _{pl}
	[°C]	[%]	[kW]	[kW]	[-]	[-]	[-]	[-]
A	-7	88	7.65	7.76	2.23	1.00	1.00	2.23
B	2	54	4.66	4.78	3.33	1.00	1.00	3.33
C	7	35	2.99	5.31	4.42	1.00	0.56	4.42
D	12	15	1.33	6.61	5.97	1.00	0.20	5.97
E(TOL)	-10	100	8.65	8.65	1.95	1.00	1.00	1.95
F(Bivalent)	-10	100	8.65	8.65	1.95	1.00	1.00	1.95

	Hours	Power input measured	Power input applied for SCOP calculation	Annual energy input
	[h]	[W]	[W]	[kWh]
Thermostat Off mode	178	0	0	0.00
Off mode	3672	8	8	29.38
Crankcase Heater	3850	8	0	0.00
Standby mode	0	8	8	0.00
			Total	29.38

Note: Prior to the SCOP calculation, the power consumption during standby mode is deducted from the crankcase heater mode, according to EN14825:2016.



Calculation of SCOP

	Outdoor temperature (dry bulb)	Hours	Heat demand	Heat demand covered by heat pump	Electrical back up heater	COP(pl)	Annual heat demand	Annual energy input including electrical back up heater
	Tj	hj	Ph(Tj)		elbu(Tj)		hj x Ph(Tj)	
	[°C]	[h]	[kW]	[kW]	[kW]	[-]	[kWh]	[kWh]
E(TOL) and F(biva	-10	1	8.65	8.65	0.00	1.95	8.65	4.44
	-9	25	8.32	8.32	0.00	2.04	207.93	101.76
	-8	23	7.98	7.98	0.00	2.14	183.65	85.95
A	-7	24	7.65	7.65	0.00	2.23	183.65	82.35
	-6	27	7.32	7.32	0.00	2.35	197.62	84.01
	-5	68	6.99	6.99	0.00	2.47	475.08	192.00
	-4	91	6.65	6.65	0.00	2.60	605.50	233.18
	-3	89	6.32	6.32	0.00	2.72	562.58	206.92
	-2	165	5.99	5.99	0.00	2.84	988.10	347.79
	-1	173	5.66	5.66	0.00	2.96	978.45	330.18
	0	240	5.32	5.32	0.00	3.09	1277.54	414.04
	1	280	4.99	4.99	0.00	3.21	1397.31	435.60
B	2	320	4.66	4.66	0.00	3.33	1490.46	447.59
	3	357	4.33	4.33	0.00	3.55	1544.03	435.18
	4	356	3.99	3.99	0.00	3.77	1421.26	377.39
	5	303	3.66	3.66	0.00	3.98	1108.86	278.33
	6	330	3.33	3.33	0.00	4.20	1097.88	261.28
C	7	326	2.99	2.99	0.00	4.42	976.12	220.84
	8	348	2.66	2.66	0.00	4.73	926.22	195.82
	9	335	2.33	2.33	0.00	5.04	780.16	154.79
	10	315	2.00	2.00	0.00	5.35	628.79	117.53
	11	215	1.66	1.66	0.00	5.66	357.64	63.19
D	12	169	1.33	1.33	0.00	5.97	224.90	37.67
	13	151	1.00	1.00	0.00	6.28	150.71	24.00
	14	105	0.67	0.67	0.00	6.59	69.87	10.60
	15	74	0.33	0.33	0.00	6.90	24.62	3.57
						Total	17867.57	5146.00
							SCOP_on	3.47
							SCOP_ref	3.45



Test results of the sound power test

Test results of the sound power measurements N°	Sound power level LW(A) [dB re 1pW]	Uncertainty (dB) (weighted value)
1	60	0.3
2	65	0.3
3	62	0.4

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.

Test results of the operating range test

N°	Air inlet dry bulb temperature (°C)	Outlet water temperature (°C)	Result
1	35	55	Passed
2	-20	55	Passed
3	-20	25	Passed

Test results of the safety tests

N°	Safety test	Result
1	Shutting of the heat transfer medium flows (EN 14511-4 clause 4.4)	Passed
2	Complete power supply failure (EN 14511-4 clause 4.5)	Passed
3	Condensate draining and enclosure sweat test (EN 14511-4 clause 4.6)	Passed
4	Defrosting (EN 14511-4 clause 4.7)	Passed



Test results for nominal performance test

N°	Test condition	COP	Heating capacity [kW]
1	A7/W35	4.96	9.22
2	A2/W35	3.76	9.00
3	A7/W55	2,95	9.14

Test results for extra test points

N°	Test condition	COP	Heating capacity [kW]
1	A7/W45	3,73	9.31
2	A2/W45	3.19	9.78
3	A2/W35	4.11	4.78
4	A-7/W35	3.00	9.87
5	A-25/W35	1.78	9.66



Indoor unit



Indoor unit rating plate



Outdoor unit



Outdoor unit rating plate





Detailed test results - Nominal performance test

Detailed result for 'EN 14511:2013' A7/W35		
Tested according to:	EN 14511:2013	
Measurement type:	Steady state	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.22
COP	-	4.96
Power consumption	kW	1.86
Measured		
Heating capacity	kW	9.26
COP	-	4.88
Power consumption	kW	1.90
During heating		
Air temperature dry bulb	°C	7.0
Air temperature wet bulb	°C	5.9
Inlet temperature	°C	30.0
Outlet temperature	°C	35.2
Flow	l/h	1539
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	176
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.037



Detailed result for 'EN 14511:2013' A2/W35		
Tested according to:	EN 14511:2013	
Measurement type:	Transient	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.00
COP	-	3.76
Power consumption	kW	2.39
Measured		
Heating capacity	kW	9.04
COP	-	3.72
Power consumption	kW	2.43
During heating		
Air temperature dry bulb	°C	2.0
Air temperature wet bulb	°C	1.0
Inlet temperature	°C	29.1
Outlet temperature	°C	34.9
Flow	l/h	1539
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	421
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.037



Detailed result for 'EN 14511:2013' A7/W55		
Tested according to:	EN 14511:2013	
Measurement type:	Steady state	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.14
COP	-	2.95
Power consumption	kW	3.09
Measured		
Heating capacity	kW	9.16
COP	-	2.94
Power consumption	kW	3.12
During heating		
Air temperature dry bulb	°C	7.0
Air temperature wet bulb	°C	6.0
Inlet temperature	°C	47.0
Outlet temperature	°C	55.1
Flow	l/h	998
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	644
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.028



Detailed test results - low temperature application

Detailed result for 'EN 14825:2016' Average Low (A) A-7/W34		
Tested according to:		EN 14825:2016
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	9.27
Heating demand:	kW	8.20
CR:	-	1
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	8.62
COP	-	3.23
Power consumption	kW	2.67
Measured		
Heating capacity	kW	8.65
COP	-	3.20
Power consumption	kW	2.71
During heating		
Air temperature dry bulb	°C	-7.0
Air temperature wet bulb	°C	-8.0
Inlet temperature	°C	29.0
Outlet temperature	°C	33.9
Outlet temperature (Time averaged)	°C	33.9
Flow	l/h	1538
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	427
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.037



Detailed result for 'EN 14825:2016' Average Low (B) A2/W30		
Tested according to:		EN 14825:2016
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	9.27
Heating demand:	kW	4.99
CR:	-	1
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	5.11
COP	-	4.88
Power consumption	kW	1.05
Measured		
Heating capacity	kW	5.13
COP	-	4.79
Power consumption	kW	1.07
During heating		
Air temperature dry bulb	°C	2.0
Air temperature wet bulb	°C	1.0
Inlet temperature	°C	25.0
Outlet temperature	°C	30.0
Outlet temperature (Time averaged)	°C	30.0
Flow	l/h	878
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	603
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.025



Detailed result for 'EN 14825:2016' Average Low (C) A7/W27		
Tested according to:		EN 14825:2016
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	9.27
Heating demand:	kW	3.21
CR:	-	1
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	6.00
COP	-	6.21
Power consumption	kW	0.97
Measured		
Heating capacity	kW	6.02
COP	-	6.06
Power consumption	kW	0.99
During heating		
Air temperature dry bulb	°C	7.0
Air temperature wet bulb	°C	6.0
Inlet temperature	°C	24.4
Outlet temperature	°C	29.4
Outlet temperature (Time averaged)	°C	27.1
Flow	l/h	1049
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	570
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.029



Detailed result for 'EN 14825:2016' Average Low (D) A12/W24		
Tested according to:		EN 14825:2016
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	9.27
Heating demand:	kW	1.43
CR:	-	0
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	7.09
COP	-	7.94
Power consumption	kW	0.89
Measured		
Heating capacity	kW	7.12
COP	-	7.70
Power consumption	kW	0.93
During heating		
Air temperature dry bulb	°C	12.0
Air temperature wet bulb	°C	11.0
Inlet temperature	°C	23.0
Outlet temperature	°C	28.0
Outlet temperature (Time averaged)	°C	24.0
Flow	l/h	1219
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	521
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.032



Detailed result for 'EN 14825:2016' Average Low (E and F) A-10/W35		
Tested according to:		EN 14825:2016
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	9.27
Heating demand:	kW	9.27
CR:	-	1
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.27
COP	-	2.87
Power consumption	kW	3.23
Measured		
Heating capacity	kW	9.31
COP	-	2.85
Power consumption	kW	3.27
During heating		
Air temperature dry bulb	°C	-10.0
Air temperature wet bulb	°C	-11.0
Inlet temperature	°C	30.0
Outlet temperature	°C	35.0
Outlet temperature (Time averaged)	°C	35.0
Flow	l/h	1608
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	398
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.038



Detailed test results - medium temperature application

Detailed result for 'EN 14825:2016' Average Medium (A) A-7/W52		
Tested according to:		EN 14825:2016
Climate zone:		Average
Temperature application:		Medium
Condition name:		A
Condition temperature:	°C	-7
Part load:	%	88%
Chosen Tbivalent	°C	-10
Tdesign	°C	-10
Pdesign	kW	8.65
Heating demand:	kW	7.65
CR:	-	1
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	7.76
COP	-	2.23
Power consumption	kW	3.48
Measured		
Heating capacity	kW	7.78
COP	-	2.22
Power consumption	kW	3.50
During heating		
Air temperature dry bulb	°C	-7.0
Air temperature wet bulb	°C	-7.9
Inlet temperature	°C	44.0
Outlet temperature	°C	52.2
Outlet temperature (Time averaged)	°C	52.2
Flow	l/h	829
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	683
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.025



Detailed result for 'EN 14825:2016' Average Medium (B) A2/W42		
Tested according to:		EN 14825:2016
Climate zone:		Average
Temperature application:		Medium
Condition name:		B
Condition temperature:	°C	2
Part load:	%	54%
Chosen Tbivalent	°C	-10
Tdesign	°C	-10
Pdesign	kW	8.65
Heating demand:	kW	4.66
CR:	-	1
Minimum flow reached:	-	Yes
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	4.78
COP	-	3.33
Power consumption	kW	1.43
Measured		
Heating capacity	kW	4.80
COP	-	3.30
Power consumption	kW	1.46
During heating		
Air temperature dry bulb	°C	2.0
Air temperature wet bulb	°C	1.0
Inlet temperature	°C	36.5
Outlet temperature	°C	42.0
Outlet temperature (Time averaged)	°C	42.0
Flow	l/h	758
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	654
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.023



Detailed result for 'EN 14825:2016' Average Medium (C) A7/W36		
Tested according to:		EN 14825:2016
Climate zone:		Average
Temperature application:		Medium
Condition name:		C
Condition temperature:	°C	7
Part load:	%	35%
Chosen Tbivalent	°C	-10
Tdesign	°C	-10
Pdesign	kW	8.65
Heating demand:	kW	2.99
CR:	-	1
Minimum flow reached:	-	Yes
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	5.31
COP	-	4.42
Power consumption	kW	1.20
Measured		
Heating capacity	kW	5.34
COP	-	4.35
Power consumption	kW	1.23
During heating		
Air temperature dry bulb	°C	7.0
Air temperature wet bulb	°C	6.0
Inlet temperature	°C	32.6
Outlet temperature	°C	38.7
Outlet temperature (Time averaged)	°C	36.0
Flow	l/h	758
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	647
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.023



Detailed result for 'EN 14825:2016' Average Medium (D) A12/W30		
Tested according to:		EN 14825:2016
Climate zone:		Average
Temperature application:		Medium
Condition name:		D
Condition temperature:	°C	12
Part load:	%	15%
Chosen Tbivalent	°C	-10
Tdesign	°C	-10
Pdesign	kW	8.65
Heating demand:	kW	1.33
CR:	-	0
Minimum flow reached:	-	Yes
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	6.61
COP	-	5.97
Power consumption	kW	1.11
Measured		
Heating capacity	kW	6.63
COP	-	5.87
Power consumption	kW	1.13
During heating		
Air temperature dry bulb	°C	12.0
Air temperature wet bulb	°C	11.0
Inlet temperature	°C	28.5
Outlet temperature	°C	36.1
Outlet temperature (Time averaged)	°C	30.0
Flow	l/h	759
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	637
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.023



Detailed result for 'EN 14825:2016' Average Medium (E and F) A-10/W55		
Tested according to:		EN 14825:2016
Climate zone:		Average
Temperature application:		Medium
Condition name:		E and F
Condition temperature:	°C	-10
Part load:	%	100%
Chosen Tbivalent	°C	-10
Tdesign	°C	-10
Pdesign	kW	8.65
Heating demand:	kW	8.65
CR:	-	1
Minimum flow reached:	-	No
Measurement type:		Steady state
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:		Yes
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	8.65
COP	-	1.95
Power consumption	kW	4.44
Measured		
Heating capacity	kW	8.68
COP	-	1.94
Power consumption	kW	4.46
During heating		
Air temperature dry bulb	°C	-10.0
Air temperature wet bulb	°C	-11.0
Inlet temperature	°C	47.0
Outlet temperature	°C	55.1
Outlet temperature (Time averaged)	°C	55.1
Flow	l/h	928
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	645
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.026



Detailed test results - Extra test points

Detailed result for 'EN 14511:2013' A7/W45		
Tested according to:	EN 14511:2013	
Measurement type:	Steady state	
<i>Data treatment according to EN14511-3:2013 Annex C</i>		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.31
COP	-	3.73
Power consumption	kW	2.50
Measured		
Heating capacity	kW	9.34
COP	-	3.69
Power consumption	kW	2.53
During heating		
Air temperature dry bulb	°C	7.1
Air temperature wet bulb	°C	6.0
Inlet temperature	°C	40.0
Outlet temperature	°C	45.1
Flow	l/h	1598
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	165
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.038



Detailed result for 'EN 14511:2013' A2/W45		
Tested according to:	EN 14511:2013	
Measurement type:	Transient	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.78
COP	-	3.19
Power consumption	kW	3.07
Measured		
Heating capacity	kW	9.82
COP	-	3.16
Power consumption	kW	3.11
During heating		
Air temperature dry bulb	°C	1.9
Air temperature wet bulb	°C	0.9
Inlet temperature	°C	39.5
Outlet temperature	°C	45.0
Flow	l/h	1588
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	155
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.038



Detailed result for 'EN 14511:2013' A2/W35		
Tested according to:	EN 14511:2013	
Measurement type:	Steady state	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	4.78
COP	-	4.11
Power consumption	kW	1.16
Measured		
Heating capacity	kW	4.82
COP	-	4.01
Power consumption	kW	1.20
During heating		
Air temperature dry bulb	°C	2.0
Air temperature wet bulb	°C	1.0
Inlet temperature	°C	32.3
Outlet temperature	°C	35.0
Flow	l/h	1539
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	440
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.037






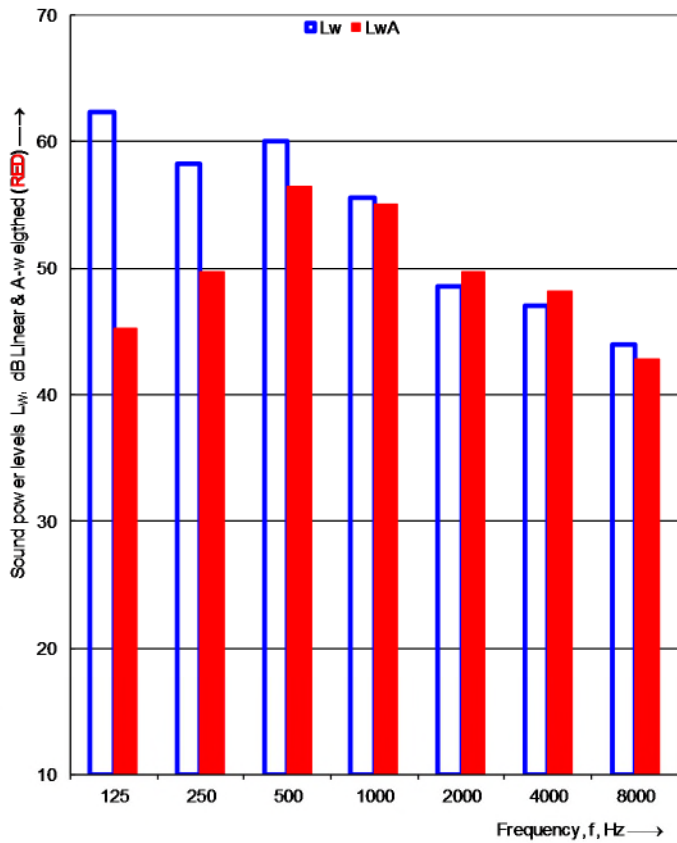
Detailed result for 'EN 14511:2013' A-7/W35		
Tested according to:	EN 14511:2013	
Measurement type:	Transient	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.87
COP	-	3.00
Power consumption	kW	3.29
Measured		
Heating capacity	kW	9.91
COP	-	2.97
Power consumption	kW	3.33
During heating		
Air temperature dry bulb	°C	-7.0
Air temperature wet bulb	°C	-8.1
Inlet temperature	°C	29.4
Outlet temperature	°C	35.0
Flow	l/h	1538
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	423
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.037



Detailed result for 'EN 14511:2013' A-25/W35		
Tested according to:	EN 14511:2013	
Measurement type:	Steady state	
Data treatment according to EN14511-3:2013 Annex C		
Integrated circulation pump:	Yes	
Corrected for power input of liquid pumps (Final result)		
Heating capacity	kW	9.66
COP	-	1.78
Power consumption	kW	5.43
Measured		
Heating capacity	kW	9.69
COP	-	1.77
Power consumption	kW	5.47
During heating		
Air temperature dry bulb	°C	-24.0
Air temperature wet bulb	°C	-15.0
Inlet temperature	°C	29.3
Outlet temperature	°C	34.8
Flow	l/h	1539
Circulation pump		
Measured: Static differential pressure, liquid pump	mbar	434
Used in calculation: Static differential pressure, liquid pump	mbar	100
Correction of power input, liquid pump	kW	0.037






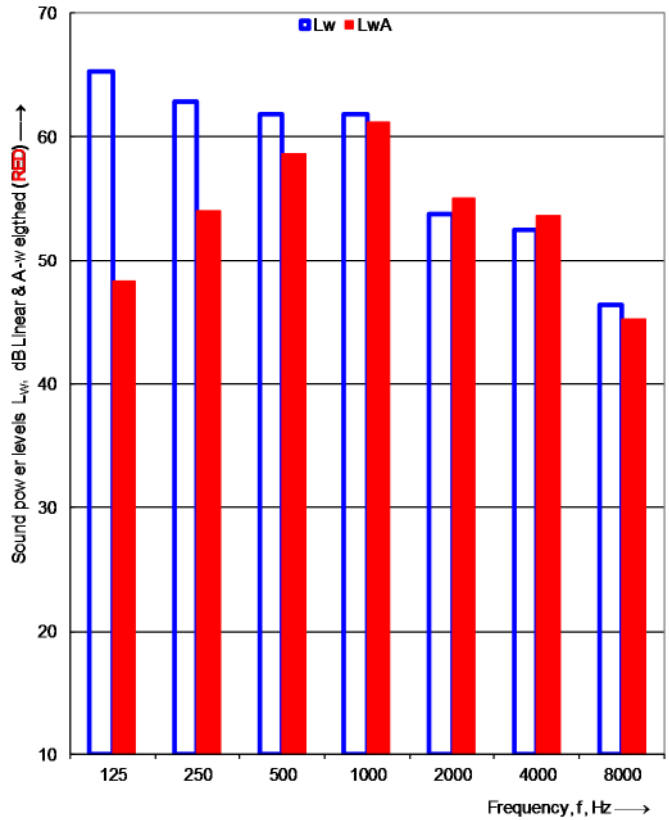
Detailed test results - sound power level - test 1

 		Sound power levels according to ISO 3743-1:2010		 TEKNOLOGISK INSTITUT																																																																			
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 15-08-2017																																																																			
Object:		Type: Split air to water heatpump Model: WH-UX9HE5 (Outdoor unit) + WH-SXC9H6E5 (Indoor unit)																																																																					
Mounting conditions:		The outdoor unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration insulators. Sound measurements on outdoor unit only, connected with indoor unit placed in neighbor room.																																																																					
Operating conditions:		A7W35, Compressor speed: 35 - 36 [Hz], Fan speed 1: 490 [rpm], Fan speed 2: 530 [rpm], Heating capacity: 9.22 [kW], COP: 4.96, Water flow rate: 1539 [l/h]																																																																					
Static pressure:		1013 kPa		Reference box:																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.3 m																																																																			
Test room volume:		102.8 m ³		L3: 1.3 m																																																																			
Area, S, of test room		138.9 m ²		Volume: 0.4 m ³																																																																			
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L_w [dB]</th><th>1/3 octave 1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>60.5</td><td></td></tr><tr><td>125</td><td>55.1</td><td>62.3</td></tr><tr><td>160</td><td>54.1</td><td></td></tr><tr><td>200</td><td>54.4</td><td></td></tr><tr><td>250</td><td>52.2</td><td>58.2</td></tr><tr><td>315</td><td>53.5</td><td></td></tr><tr><td>400</td><td>57.4</td><td></td></tr><tr><td>500</td><td>53.5</td><td>60.1</td></tr><tr><td>630</td><td>53.9</td><td></td></tr><tr><td>800</td><td>54.3</td><td></td></tr><tr><td>1000</td><td>46.9</td><td>55.6</td></tr><tr><td>1250</td><td>46.3</td><td></td></tr><tr><td>1600</td><td>44.1</td><td></td></tr><tr><td>2000</td><td>42.7</td><td>48.5</td></tr><tr><td>2500</td><td>44.2</td><td></td></tr><tr><td>3150</td><td>44.9</td><td></td></tr><tr><td>4000</td><td>41.8</td><td>47.0</td></tr><tr><td>5000</td><td>36.6</td><td></td></tr><tr><td>6300</td><td>34.8</td><td></td></tr><tr><td>8000</td><td>42.7</td><td>43.9</td></tr><tr><td>10000</td><td>34.7</td><td></td></tr></tbody></table>		Frequency f [Hz]	L _w [dB]	1/3 octave 1/1 oct [dB]	100	60.5		125	55.1	62.3	160	54.1		200	54.4		250	52.2	58.2	315	53.5		400	57.4		500	53.5	60.1	630	53.9		800	54.3		1000	46.9	55.6	1250	46.3		1600	44.1		2000	42.7	48.5	2500	44.2		3150	44.9		4000	41.8	47.0	5000	36.6		6300	34.8		8000	42.7	43.9	10000	34.7					
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		Sound power level L_w(A): 60 dB [re 1pW]																																																																					
Name of test institute:		DTI																																																																					
No. of test report:		300-KLAB-16-012																																																																					
Date:		15-08-2017																																																																					






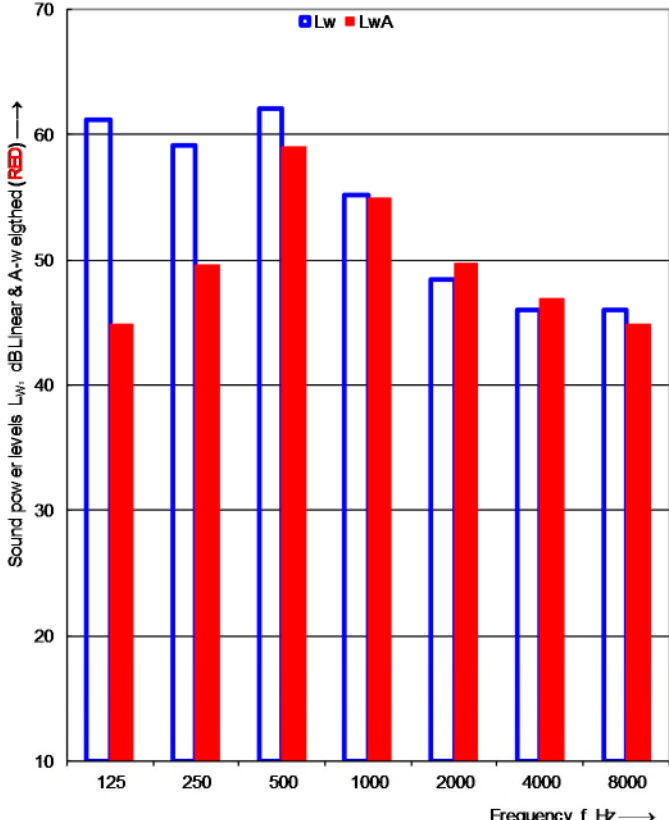


Detailed test results - sound power level - test 2

 		Sound power levels according to ISO 3743-1:2010																																																																					
Engineering method for small, movable sources in reverberant fields - Comparison method for hard-walled test rooms																																																																							
Client:		Panasonic Marketing Europe GmbH		Date of test: 16-08-2017																																																																			
Object:		Type: Split air to water heatpump Model: WH-UX9HE5 (Outdoor unit) + WH-SXC9H6E5 (Indoor unit)																																																																					
Mounting conditions:		The outdoor unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration insulators. Sound power measurement on outdoor unit only. The indoor unit is placed in neighbor room.																																																																					
Operating conditions:		A7W55, Compressor speed: 40 - 41 [Hz], Fan speed 1: 500[rpm], Fan speed 2: 540[rpm], Heating capacity: 9.14[kW], COP: 2.95, Water flow rate: 998 [l/h]																																																																					
Static pressure:		1013 kPa		<u>Reference box:</u>																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.3 m																																																																			
Test room volume:		102.8 m³		L3: 1.3 m																																																																			
Area, S, of test room:		138.9 m²		Volume: 0.4 m³																																																																			
<table border="1"><thead><tr><th>Frequency f [Hz]</th><th>L_w 1/3 octave [dB]</th><th>1/1 oct [dB]</th></tr></thead><tbody><tr><td>100</td><td>63.7</td><td></td></tr><tr><td>125</td><td>55.3</td><td>65.2</td></tr><tr><td>160</td><td>58.2</td><td></td></tr><tr><td>200</td><td>58.4</td><td></td></tr><tr><td>250</td><td>59.5</td><td>62.8</td></tr><tr><td>315</td><td>55.3</td><td></td></tr><tr><td>400</td><td>58.0</td><td></td></tr><tr><td>500</td><td>54.8</td><td>61.8</td></tr><tr><td>630</td><td>57.6</td><td></td></tr><tr><td>800</td><td>61.1</td><td></td></tr><tr><td>1000</td><td>52.4</td><td>61.8</td></tr><tr><td>1250</td><td>47.7</td><td></td></tr><tr><td>1600</td><td>44.5</td><td></td></tr><tr><td>2000</td><td>45.2</td><td>53.8</td></tr><tr><td>2500</td><td>52.5</td><td></td></tr><tr><td>3150</td><td>50.2</td><td></td></tr><tr><td>4000</td><td>48.1</td><td>52.5</td></tr><tr><td>5000</td><td>39.9</td><td></td></tr><tr><td>6300</td><td>38.2</td><td></td></tr><tr><td>8000</td><td>44.5</td><td>46.3</td></tr><tr><td>10000</td><td>39.0</td><td></td></tr></tbody></table>		Frequency f [Hz]	L _w 1/3 octave [dB]	1/1 oct [dB]	100	63.7		125	55.3	65.2	160	58.2		200	58.4		250	59.5	62.8	315	55.3		400	58.0		500	54.8	61.8	630	57.6		800	61.1		1000	52.4	61.8	1250	47.7		1600	44.5		2000	45.2	53.8	2500	52.5		3150	50.2		4000	48.1	52.5	5000	39.9		6300	38.2		8000	44.5	46.3	10000	39.0					
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		Sound power level L _w (A): 65 dB [re 1pW]																																																																					
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Detailed test results - sound power level - test 3

 		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: 16-08-2017																																																																			
Object:		Type: Split air to water heatpump Model: WH-UX9H-E5 (Outdoor unit) + WH-SXC9H-E5 (Indoor unit)																																																																					
Mounting conditions:		The outdoor unit is standing free on four 5.5 cm thick heavy concrete tiles placed on a vibration damping mat, which is placed on a water drop tray. The water drop tray is located on a 2.5 cm thick wooden board laying on the floor. The outdoor unit is mounted on the supporting metal support frame using 4 vibration insulators. Sound power measurement on outdoor unit only. The indoor unit is placed in neighbor room.																																																																					
Operating conditions:		A7W55, Compressor speed: 29 - 30 [Hz], Fan speed 1: 360[rpm], Fan speed 2: 380[rpm], Heating capacity: 4.2[kW], COP: 2.2, Water flow rate: 730 [l/h], Quiet mode 3																																																																					
Static pressure:		1013 kPa		Reference box:																																																																			
Air temperature:		7.0 °C		L1: 0.9 m																																																																			
Relative air humidity:		84.0 %		L2: 0.3 m																																																																			
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Area, S, of test room		138.9 m²		Volume: 0.4 m³																																																																			
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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 14511:2013
- EN 12102
- DS/EN 3743/1

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

