TESTING REPORT	Report No :	ERP-P2021-00001		
PURPOSE 1) Europe Energy Labelling and MEPS application for model **WH-ADF0309J3E5CM / CU-2WZ71YBE5** as per requirement of Lot1	Report Date :	25. Aug. 2021		
	Venue :	PAPARADMY, Psychro L testing room		
	Approved	Checked	Checked	Draft
	Y.Tajima	T4		

1 Test Sample

Model Name	Samples
WH-ADF0309J3E5CM	1
CU-2WZ71YBE5	1

2 Details / Ratings

Brand	**Panasonic**		
Rated voltage / phase / frequency	230V 1ø	50Hz	
Type of heat pump	✔ air-to-water	☐ water-to-water	☐ brine-to-water
Temperature application	✔ 35°C	✔ 55°C	
Water flow	☐ Fixed	✔ Variable	
Water oultet temperature	☐ Fixed	✔ Variable	

3 Details / Testing Conditions

Test mode	☐ Cooling	✔ Heating
Test type	☐ Cooling capacity ✔ Heating capacity ✔ Sound Power	✔ Thermostat off power ✔ Standby power
Test room type	☐ Calorimeter room ✔ Reverberation room	✔ Psychrometric room ☐ Anechoic room
Test standard	EN 14511 EN 14825 EN 12102-1	

4 The heating climate condition to declare

		Average		Colder		Warmer	
Rated heating Pdesign	35°C	7	kW	6	kW	7	kW
Rated SCOP /Rank	35°C	4.00	A++	3.61	A+	5.69	A+++
Tbivalent(heating)	35°C	-10	°C	-15	°C	2	°C
Rated heating Pdesign	55°C	7	kW	6	kW	6	kW
Rated SCOP /Rank	55°C	3.20	A++	2.80	A+	3.69	A++
Tbivalent(heating)	55°C	-7	°C	-15	°C	2	°C
Rated Sound power in heating	55°C	indoor	41 dB	outdoor		69	dB
Rated sound power accordance to EN 14825						61	dB

5 Heating/(Average, 35°C) capacity test conditions

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Supply voltage/frequency		230V 1ø , 50Hz	←	←	←
Stabilization period (minutes)		Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)		3 hours / 10 second	3 hours / 10 second	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition					
mean dry bulb (±0.3 K)		-7.01	1.98	7.00	12.02
max variation (±1 K)		0.05	0.03	0.04	0.05
mean wet bulb (±0.4 K)		-8.02	1.01	5.98	10.99
max variation (±1 K)		0.05	0.04	0.05	0.05
Water IN/OUT condition					
Water Out temperature, T_{out}	°C	*34.05*	*30.50*	*27.29*	*25.38*
Water In temperature, T_{in}	°C	29.02	25.22	25.56	23.27
Heating flow rate, q_w	l/min	*17.73*	*10.48*	*23.94*	*23.54*

DISTRIBUTE:

TESTING REPORT	Report No : ERP-P2021-00001

(cont)

5 Heating/(Average, 35°C) capacity test conditions

		Part load (F)	TOL
Supply voltage/frequency		230V 1ø , 50Hz	←
Stabilization period (minutes)		Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)		70 minutes / 30 second	70 minutes / 30 second
Outdoor condition			
mean dry bulb (±0.3 K)		-10.05	-10.05
max variation (±1 K)		0.33	0.33
mean wet bulb (±0.4 K)		-11.02	-11.02
max variation (±1 K)		0.33	0.33
Water IN/OUT condition			
Water Out temperature, T_{ou}	°C	*35.02*	*35.02*
Water In temperature, T_{in}	°C	29.94	29.94
Heating flow rate, q_W	l/min	*20.27*	*20.27*

6 Heating/(Average, 35°C) capacity test results

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Measured heating capacity	kW	6.226	3.859	2.890	3.457
Measured power input	kW	2.181	0.989	0.589	0.528
Measured COP	W/W	2.854	3.900	4.904	6.553

		Part load (F)	TOL
Measured heating capacity	kW	7.181	7.181
Measured power input	kW	2.760	2.760
Measured COP	W/W	2.602	2.602

7 Heating/(Average, 55°C) capacity test conditions

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Supply voltage/frequency		230V 1ø , 50Hz	←	←	←
Stabilization period (minutes)		Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)		70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition					
mean dry bulb (±0.3 K)		-7.02	1.96	6.98	12.01
max variation (±1 K)		0.05	0.09	0.05	0.05
mean wet bulb (±0.4 K)		-8.01	0.98	6.01	11.02
max variation (±1 K)		0.05	0.07	0.04	0.05
Water IN/OUT condition					
Water Out temperature, T_{ou}	°C	*51.97*	*41.96*	*36.03*	*32.04*
Water In temperature, T_{in}	°C	43.96	35.47	31.48	29.07
Heating flow rate, q_W	l/min	*11.06*	*8.35*	*8.20*	*15.47*

DISTRIBUTE:

TESTING REPORT	Report No : ERP-P2021-00001

(cont)

7 Heating/(Average, 55°C) capacity test conditions

	Part load (F)	TOL
Supply voltage/frequency	230V 1ø , 50Hz	←
Stabilization period (minutes)	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition		
mean dry bulb (±0.3 K)	-10.02	-10.02
max variation (±1 K)	0.10	0.10
mean wet bulb (±0.4 K)	-11.00	-11.00
max variation (±1 K)	0.30	0.30
Water IN/OUT condition		
Water Out temperature, T_{out} °C	*54.99*	*54.99*
Water In temperature, T_{in} °C	47.83	47.54
Heating flow rate, q_W l/min	*12.36*	*12.36*

8 Heating/(Average, 55°C) capacity test results

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Measured heating capacity	kW	6.178	3.778	2.601	3.200
Measured power input	kW	2.887	1.195	0.666	0.587
Measured COP	W/W	2.140	3.161	3.902	5.451

		Part load (F)	TOL
Measured heating capacity	kW	6.178	6.421
Measured power input	kW	2.887	3.560
Measured COP	W/W	2.140	1.804

9 Heating/(Warmer, 35°C) capacity test conditions

	Part load (B)	Part load (C)	Part load (D)	Part load (F)
Supply voltage/frequency	230V 1ø , 50Hz	←	←	←
Stabilization period (minutes)	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)	3 hours / 10 second	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition				
mean dry bulb (±0.3 K)	1.99	6.99	12.00	1.99
max variation (±1 K)	0.05	0.04	0.04	0.05
mean wet bulb (±0.4 K)	1.02	6.01	10.98	1.02
max variation (±1 K)	0.05	0.05	0.04	0.05
Water IN/OUT condition				
Water Out temperature, T_{out} °C	*35.00*	*30.96*	*26.86*	*35.00*
Water In temperature, T_{in} °C	30.02	26.07	24.87	*30.02*
Heating flow rate, q_W l/min	*20.05*	*12.84*	*24.83*	*20.05*

DISTRIBUTE:

TESTING REPORT	Report No : ERP-P2021-00001

(cont)

9 Heating/(Warmer, 35°C) capacity test conditions

	TOL
Supply voltage/frequency	230V 1ø , 50Hz
Stabilization period (minutes)	Not less than 60 minutes
Test period/ reading frequency (minutes)	70 minutes / 30 second
Outdoor condition	
mean dry bulb (±0.3 K)	1.99
max variation (±1 K)	0.05
mean wet bulb (±0.4 K)	1.02
max variation (±1 K)	0.05
Water IN/OUT condition	
Water Out temperature, T_{ou} °C	35.00
Water In temperature, T_{in} °C	30.02
Heating flow rate, q_W l/min	20.05

10 Heating/(Warmer, 35°C) capacity test results

		Part load (B)	Part load (C)	Part load (D)	Part load (F)
Measured heating capacity	kW	6.970	4.382	3.442	6.970
Measured power input	kW	2.147	0.849	0.462	2.147
Measured COP	W/W	3.246	5.159	7.451	3.246

		TOL
Measured heating capacity	kW	6.970
Measured power input	kW	2.147
Measured COP	W/W	3.246

11 Heating/(Warmer, 55°C) capacity test conditions

	Part load (B)	Part load (C)	Part load (D)	Part load (F)
Supply voltage/frequency	230V 1ø , 50Hz	←	←	←
Stabilization period (minutes)	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition				
mean dry bulb (±0.3 K)	2.03	7.02	12.01	2.03
max variation (±1 K)	0.05	0.04	0.04	0.05
mean wet bulb (±0.4 K)	1.02	6.03	11.02	1.02
max variation (±1 K)	0.03	0.06	0.05	0.03
Water IN/OUT condition				
Water Out temperature, T_{ou} °C	*55.08*	*45.87*	*35.17*	55.08
Water In temperature, T_{in} °C	47.01	39.18	32.35	47.01
Heating flow rate, q_W l/min	*10.65*	*8.17*	*15.77*	10.65

DISTRIBUTE:

TESTING REPORT	Report No : ERP-P2021-00001

(cont)

11 Heating/(Warmer, 55°C) capacity test conditions

		TOL
Supply voltage/frequency		230V 1ø , 50Hz
Stabilization period (minutes)		Not less than 60 minutes
Test period/ reading frequency (minutes)		70 minutes / 30 second
Outdoor condition		
mean dry bulb (±0.3 K)		2.03
max variation (±1 K)		0.05
mean wet bulb (±0.4 K)		1.02
max variation (±1 K)		0.03
Water IN/OUT condition		
Water Out temperature, T_{OL}	°C	55.08
Water In temperature, T_{in}	°C	47.01
Heating flow rate, q_W	l/min	10.65

12 Heating/(Warmer, 55°C) capacity test results

		Part load (B)	Part load (C)	Part load (D)	Part load (F)
Measured heating capacity	kW	5.994	3.814	3.098	5.994
Measured power input	kW	2.497	1.198	0.637	2.497
Measured COP	W/W	2.401	3.184	4.865	2.401

		TOL
Measured heating capacity	kW	5.990
Measured power input	kW	2.495
Measured COP	W/W	2.401

13 Heating/(Colder, 35°C) capacity test conditions

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Supply voltage/frequency		230V 1ø , 50Hz	←	←	←
Stabilization period (minutes)		Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)		3 hours / 10 second	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition					
mean dry bulb (±0.3 K)		-7.03	1.99	6.98	12.00
max variation (±1 K)		0.05	0.05	0.04	0.05
mean wet bulb (±0.4 K)		-8.01	1.02	5.98	11.03
max variation (±1 K)		0.05	0.06	0.04	0.05
Water IN/OUT condition					
Water Out temperature, T_{OL}	°C	*30.03*	*27.17*	*25.69*	*25.55*
Water In temperature, T_{in}	°C	25.07	25.85	24.03	23.67
Heating flow rate, q_W	l/min	*10.46*	*24.43*	*24.66*	*24.67*

TESTING REPORT	Report No : ERP-P2021-00001

(cont)

13 Heating/(Colder, 35°C) capacity test conditions

	Part load (F)	Part load (G)	TOL
Supply voltage/frequency	230V 1ø , 50Hz	←	←
Stabilization period (minutes)	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)	3 hours / 10 second	70 minutes / 30 second	3 hours / 10 second
Outdoor condition			
mean dry bulb (±0.3 K)	-15.03	-15.03	-15.03
max variation (±1 K)	0.04	0.04	0.04
mean wet bulb (±0.4 K)	-	-	-
max variation (±1 K)	-	-	-
Water IN/OUT condition			
Water Out temperature, T_{out} °C	*32.02*	*32.02*	*32.02*
Water In temperature, T_{in} °C	27.04	27.04	28.39
Heating flow rate, q_W l/min	*14.01*	*14.01*	*14.01*

14 Heating/(Colder, 35°C) capacity test results

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Measured heating capacity	kW	3.621	2.249	2.854	3.240
Measured power input	kW	1.181	0.454	0.462	0.374
Measured COP	W/W	3.064	4.955	6.181	8.655

		Part load (F)	Part load (G)	TOL
Measured heating capacity	kW	4.863	4.863	3.547
Measured power input	kW	1.897	1.898	1.916
Measured COP	W/W	2.564	2.562	1.851

15 Heating/(Colder, 55°C) capacity test conditions

	Part load (A)	Part load (B)	Part load (C)	Part load (D)
Supply voltage/frequency	230V 1ø , 50Hz	←	←	←
Stabilization period (minutes)	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second	70 minutes / 30 second
Outdoor condition				
mean dry bulb (±0.3 K)	-7.04	2.02	7.03	12.02
max variation (±1 K)	0.05	0.04	0.04	0.04
mean wet bulb (±0.4 K)	-8.02	1.02	6.02	11.02
max variation (±1 K)	0.05	0.06	0.06	0.04
Water IN/OUT condition				
Water Out temperature, T_{out} °C	*43.95*	*37.10*	*33.03*	*29.25*
Water In temperature, T_{in} °C	37.55	33.14	30.56	27.39
Heating flow rate, q_W l/min	*8.09*	*8.07*	*15.39*	*24.67*

TESTING REPORT	Report No : ERP-P2021-00001

(cont)

15 Heating/(Colder, 55°C) capacity test conditions

	Part load (F)	Part load (G)	TOL
Supply voltage/frequency	230V 1ø , 50Hz	←	←
Stabilization period (minutes)	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes
Test period/ reading frequency (minutes)	3 hours / 10 second	70 minutes / 30 second	3 hours / 10 second
Outdoor condition			
mean dry bulb (±0.3 K)	-15.04	-15.04	-15.04
max variation (±1 K)	0.05	0.05	0.05
mean wet bulb (±0.4 K)	-	-	-
max variation (±1 K)	-	-	-
Water IN/OUT condition			
Water Out temperature, T_{ou} °C	*48.97*	*48.97*	*48.97*
Water In temperature, T_{in} °C	41.07	41.07	41.06
Heating flow rate, q_W l/min	*8.79*	*8.79*	*8.79*

16 Heating/(Colder, 55°C) capacity test results

		Part load (A)	Part load (B)	Part load (C)	Part load (D)
Measured heating capacity	kW	3.611	2.227	2.653	3.201
Measured power input	kW	1.484	0.644	0.566	0.470
Measured COP	W/W	2.434	3.459	4.684	6.807

		Part load (F)	Part load (G)	TOL
Measured heating capacity	kW	4.845	4.845	4.850
Measured power input	kW	2.616	2.616	2.622
Measured COP	W/W	1.852	1.852	1.850

17 Standby mode test conditions

		HSB	HOFF	HCK
Outdoor condition				
mean dry bulb (±0.3 K)		12.02	←	12.00
max variation (±1 K)		0.03	←	0.12
mean wet bulb (±0.4 K)		10.99	←	11.00
max variation (±1 K)		0.03	←	0.18
Water IN/OUT condition				
Water Out temperature, T_{out}	°C	*23.33*	←	*25.30*
Water In temperature, T_{in}	°C	*23.27*	←	*25.22*
Heating flow rate, q_W	l/min	-	←	-
Supply voltage (230V± 1%)	V	229.1 - 230.8	←	←
Supply frequency (50Hz ±1%)	Hz	49.5 - 50.5	←	←
Stabilization period (minutes)		Not less than 5		
Total Harmonic Distortion (<0.2%)	%	0.1	←	←

18 Standby mode test results (35°C or 55°C which is worse)

Does this model have a crankcase heater function?	YES

Measured standby power	(35°C)	
HSB passive standby power consumption, Standby mode	11.0	W
HOFF passive standby power consumption, OFF mode	11.0	W
HCK passive standby power consumption, crank-case heater	0.0	W

DISTRIBUTE:

TESTING REPORT	Report No : ERP-P2021-00001

19 Thermostat off mode test conditions 8. Jan. 2019

		HTO
Outdoor condition		
mean dry bulb (±0.3 K)		12.01
max variation (±1 K)		0.04
mean wet bulb (±0.4 K)		11.03
max variation (±1 K)		0.03
Water IN/OUT condition		
Water Out temperature, T_{out}	°C	*23.33*
Water In temperature, T_{in}	°C	*23.27*
Heating flow rate, q_W	l/min	*9.16*
Supply voltage (230V± 1%)	V	229.1 - 230.8
Supply frequency (50Hz ±1%)	Hz	49.5 - 50.5
Stabilization period (minutes)		Not less than 5
Total Harmonic Distortion (<0.2%)	%	0.1

20 Thermostat off mode test results (35°C or 55°C which is worse)

Measured standby power	(35°C)
HTO passive standby power consumption, thermostat off mode	41.0 W

21 Heating sound power test conditions (55°C)

	Full load
Supply voltage/frequency	230V 1ø 50Hz
Stabilization period (minutes)	Not less than 60 minutes
Outdoor condition	
mean dry bulb (7°C ±0.3 K)	7.03
max variation (±1 K)	0.10
mean wet bulb (6°C ±0.4 K)	6.04
max variation (±1 K)	0.09
Water IN/OUT condition	
Water Out temperature, T_{out} °C	*55.02*
Water In temperature, T_{in} °C	*47.05*
Heating flow rate, q_W l/min	*14.31*

22 Heating sound power test results (55°C)

		indoor	outdoor	outdoor (EN 14825)
Measured sound power level	dB	41.0	68.3	60.1

Rated heat output (Prated)	Maximum Sound Power Level at (A7W55) Indoor	outdoor	Judge
Prated ≤ 6kW	60	65	
6kW < Prated ≤ 12kW ➡	65	70	OK
12kW < Prated ≤ 30kW	70	78	
30kW < Prated ≤ 70kW	80	88	

23 Determination of ∑Fi

Air-to-Water Heat Pump

F(1) = 3 F(2) = 0

∑Fi = F(1) + F(2) = 3 %

24 See Appendix A for calculations

25 Remarks

DISTRIBUTE:

APPENDIX A / Page 1 of 6 | Report No: ERP-P2021-00001

Performance Testing Data for SCOP (55°C) - Average

Condition	Outdoor air T (°C)	Part load ratio (%)	Part load (kW)	Water outlet temperature (°C)	Declared Capacity (kW)	COP at DC	Cc	Cru	COP at PL
E (TOL)	-10	100	7.00	55	6.4	1.80			1.80
A	-7	88	6.19	52	6.2	2.14	0.99	1.00	2.14
B	2	54	3.77	42	3.8	3.16	0.97	1.00	3.16
C	7	35	2.42	36	2.6	3.90	0.94	0.93	3.90
D	12	15	1.08	30	3.2	5.45	0.93	0.34	4.79
F (Tbiv)	-7	88	6.19	52	6.2	2.14			2.14

WH-ADF0309J3E5CM

WH-UD09HE5-1	Bin j	Outdoor air temp. Tj	Hours hj	Part load ratio (%)	Heat demand Ph(tj) (kW)	Heating capacity of the heat pump (kW)	COP(Tj)	Electric back up heater elbu(Tj) (kW)	Annual heating demand hj*Ph(Tj) (kWh)	Annual power input with electrical back up heater (kWh)
	9	-22	0	146%	10.23	0.000	0.000	10.23	0	0
	10	-21	0	142%	9.96	0.000	0.000	9.96	0	0
	11	-20	0	138%	9.69	0.000	0.000	9.69	0	0
	12	-19	0	135%	9.42	0.000	0.000	9.42	0	0
	13	-18	0	131%	9.15	0.000	0.000	9.15	0	0
	14	-17	0	127%	8.88	0.000	0.000	8.88	0	0
	15	-16	0	123%	8.62	0.000	0.000	8.62	0	0
	16	-15	0	119%	8.35	0.000	0.000	8.35	0	0
	17	-14	0	115%	8.08	0.000	0.000	8.08	0	0
	18	-13	0	112%	7.81	0.000	0.000	7.81	0	0
	19	-12	0	108%	7.54	0.000	0.000	7.54	0	0
	20	-11	0	104%	7.27	0.000	0.000	7.27	0	0
TOL	21	-10	1	100%	7.00	6.421	1.804	0.58	7	4
	22	-9	25	96%	6.73	6.340	1.916	0.39	168	92
	23	-8	23	92%	6.46	6.259	2.028	0.20	149	76
A	24	-7	24	88%	6.19	6.178	2.140	0.00	149	69
F	25	-6	27	85%	5.92	5.911	2.254	0.00	160	71
	26	-5	68	81%	5.65	5.643	2.367	0.00	384	162
	27	-4	91	77%	5.38	5.375	2.480	0.00	490	198
	28	-3	89	73%	5.12	5.108	2.594	0.00	455	176
	29	-2	165	69%	4.85	4.840	2.707	0.00	800	295
	30	-1	173	65%	4.58	4.572	2.821	0.00	792	281
	31	0	240	62%	4.31	4.305	2.934	0.00	1034	352
	32	1	280	58%	4.04	4.037	3.047	0.00	1131	371
B	33	2	320	54%	3.77	3.769	3.161	0.00	1206	382
	34	3	357	50%	3.50	3.500	3.309	0.00	1250	378
	35	4	356	46%	3.23	3.231	3.457	0.00	1150	333
	36	5	303	42%	2.96	2.962	3.606	0.00	897	249
	37	6	330	38%	2.69	2.692	3.754	0.00	888	237
C	38	7	326	35%	2.42	2.423	3.902	0.00	790	202
	39	8	348	31%	2.15	2.154	4.080	0.00	750	184
	40	9	335	27%	1.88	1.885	4.258	0.00	631	148
	41	10	315	23%	1.62	1.615	4.436	0.00	509	115
	42	11	215	19%	1.35	1.346	45.600	0.00	289	63
D	43	12	169	15%	1.08	1.077	4.791	43.00	182	38
	44	13	151	12%	0.81	0.808	4.969	0.00	122	25
	45	14	105	8%	0.54	0.538	5.146	0.00	57	11
	46	15	74	4%	0.27	0.269	5.324	0.00	20	4
								Σ	14459	4514

Q_{H} = $P_{designh}$ x H_{HE}

= 14462 kWh

SCOPon = (Annual heating demand) / (Annual power input with electrical back up heater)

= 3.203 W/W

Q_{HE} = $Q_H/SCOP_{on}$ +$H_{TO}xP_{TO}$+$H_{SB}xP_{SB}$+$H_{CK}xP_{CK}$+$H_{OFF}xP_{OFF}$

= **4522.3** kWh

SCOP = Q_H / Q_{HE}

= **3.198** W/W

∑Fi = F(1) + F(2)

= 3 %

$\eta_{s\ (Tested)}$ = (100/CC) × SCOP - ΣF(i)

= **125%** **A++**

	Standby power		
	Pxx	Hxx	
		Heating only	Reversible
TO	41	178	178
SB	11	0	0
OFF	11	3672	0
CK	0	3850	178

MEPS -Heat

MEPS (26.09.2015~)		MEPS (26.09.2017~)	
Min η_s	Judge	**Min η_s**	Judge
100%	**OK**	110%	**OK**

(Labelled)

$SCOP_{(rated)}$ **3.20** Q_{HE} **4524** $\eta_{s\ (Rated)}$ **125%** **A++**

APPENDIX A / Page 2 of 6 | Report No: ERP-P2021-00001

Performance Testing Data for SCOP (35°C) - Average

Condition	Outdoor air T (°C)	Part load ratio (%)	Part load (kW)	Water outlet temperature (°C)	Declared Capacity (kW)	COP at DC	Cc	Cru	COP at PL
E (TOL)	-10	100	7.00	35	7.2	2.60			2.60
A	-7	88	6.19	34	6.2	2.85	0.98	0.99	2.85
B	2	54	3.77	30	3.9	3.90	0.96	0.98	3.90
C	7	35	2.42	27	2.9	4.90	0.93	0.84	4.84
D	12	15	1.08	24	3.5	6.55	0.92	0.31	5.59
F (Tbiv)	-10	100	7.00	35	7.2	2.60			2.60

Condition	Bin j	Outdoor air temp. Tj	Hours hj	Part load ratio (%)	Heat demand Ph(tj) (kW)	Heating capacity of the heat pump (kW)	COP(Tj)	Electric back up heater elbu(Tj) (kW)	Annual heating demand hj*Ph(Tj) (kWh)	Annual power input with electrical back up heater (kWh)
	9	-22	0	146%	10.23	0.000	0.000	10.23	0	0
	10	-21	0	142%	9.96	0.000	0.000	9.96	0	0
	11	-20	0	138%	9.69	0.000	0.000	9.69	0	0
	12	-19	0	135%	9.42	0.000	0.000	9.42	0	0
	13	-18	0	131%	9.15	0.000	0.000	9.15	0	0
	14	-17	0	127%	8.88	0.000	0.000	8.88	0	0
	15	-16	0	123%	8.62	0.000	0.000	8.62	0	0
	16	-15	0	119%	8.35	0.000	0.000	8.35	0	0
	17	-14	0	115%	8.08	0.000	0.000	8.08	0	0
	18	-13	0	112%	7.81	0.000	0.000	7.81	0	0
	19	-12	0	108%	7.54	0.000	0.000	7.54	0	0
	20	-11	0	104%	7.27	0.000	0.000	7.27	0	0
TOL / F	21	-10	1	100%	7.00	7.181	2.602	0.00	7	3
	22	-9	25	96%	6.73	6.852	2.686	0.00	168	63
	23	-8	23	92%	6.46	6.522	2.770	0.00	149	54
A	24	-7	24	88%	6.19	6.192	2.854	0.00	149	52
	25	-6	27	85%	5.92	5.923	2.970	0.00	160	54
	26	-5	68	81%	5.65	5.654	3.087	0.00	384	125
	27	-4	91	77%	5.38	5.385	3.203	0.00	490	153
	28	-3	89	73%	5.12	5.115	3.319	0.00	455	137
	29	-2	165	69%	4.85	4.846	3.435	0.00	800	233
	30	-1	173	65%	4.58	4.577	3.552	0.00	792	223
	31	0	240	62%	4.31	4.308	3.668	0.00	1034	282
	32	1	280	58%	4.04	4.038	3.784	0.00	1131	299
B	33	2	320	54%	3.77	3.769	3.900	0.00	1206	309
	34	3	357	50%	3.50	3.500	4.088	0.00	1250	306
	35	4	356	46%	3.23	3.231	4.276	0.00	1150	269
	36	5	303	42%	2.96	2.962	4.464	0.00	897	201
	37	6	330	38%	2.69	2.692	4.652	0.00	888	191
C	38	7	326	35%	2.42	2.423	4.839	0.00	790	163
	39	8	348	31%	2.15	2.154	4.990	0.00	750	150
	40	9	335	27%	1.88	1.885	5.140	0.00	631	123
	41	10	315	23%	1.62	1.615	5.291	0.00	509	96
	42	11	215	19%	1.35	1.346	5.442	0.00	289	53
D	43	12	169	15%	1.08	1.077	5.592	0.00	182	33
	44	13	151	12%	0.81	0.808	5.743	0.00	122	21
	45	14	105	8%	0.54	0.538	5.893	0.00	57	10
	46	15	74	4%	0.27	0.269	6.044	0.00	20	3
								Σ	14459	3604

$Q_{H} = P_{designh} \times H_{HE}$

= 14462 kWh

SCOPon = (Annual heating demand) / (Annual power input with electrical back up heater)

= 4.012 W/W

$Q_{HE} = Q_H/SCOP_{on} + H_{TO}xP_{TO} + H_{SB}xP_{SB} + H_{CK}xP_{CK} + H_{OFF}xP_{OFF}$

= **3612.1** kWh

$SCOP = Q_H / Q_{HE}$

= **4.004** W/W

$\sum Fi = F(1) + F(2)$

= 3 %

$\eta_{s\ (Tested)} = (100/CC) \times SCOP - \sum F(i)$

= **157%** **A++**

	Standby power		
	Pxx	Hxx	
		Heating only	Reversible
TO	41	178	178
SB	11	0	0
OFF	11	3672	0
CK	0	3850	178

MEPS -Heat

MEPS (26.09.2015~)		MEPS (26.09.2017~)	
Min η_s	Judge	**Min η_s**	Judge
100%	**OK**	110%	**OK**

(Labelled) $SCOP_{(rated)}$ **4.00** Q_{HE} **3614** $\eta_{s\ (Rated)}$ **157%** **A++**

APPENDIX A / Page 3 of 6 | Report No: ERP-P2021-00001

Performance Testing Data for SCOP (55°C) - Warmer

Condition	Outdoor air T (°C)	Part load ratio (%)	Part load (kW)	Water outlet temperature (°C)	Declared Capacity (kW)	COP at DC	Cc	Cru	COP at PL
E (TOL)	2	100	6.00	55	0.0	0.00			0.00
A									
B	2	100	6.00	55	6.0	2.40	0.98	1.00	2.40
C	7	64	3.86	46	3.8	3.18	0.97	1.00	3.18
D	12	29	1.71	34	3.1	4.86	0.94	0.55	4.62
F (Tbiv)	2	100	6.00	55	6.0	2.40			2.40

Condition	Bin j	Outdoor air temp. Tj	Hours hj	Part load ratio (%)	Heat demand Ph(tj) (kW)	Heating capacity of the heat pump (kW)	COP(Tj)	Electric back up heater elbu(Tj) (kW)	Annual heating demand hj*Ph(Tj) (kWh)	Annual power input with electrical back up heater (kWh)
	9	-22	0	271%	16.29	0.000	0.000	16.29	0	0
	10	-21	0	264%	15.86	0.000	0.000	15.86	0	0
	11	-20	0	257%	15.43	0.000	0.000	15.43	0	0
	12	-19	0	250%	15.00	0.000	0.000	15.00	0	0
	13	-18	0	243%	14.57	0.000	0.000	14.57	0	0
	14	-17	0	236%	14.14	0.000	0.000	14.14	0	0
	15	-16	0	229%	13.71	0.000	0.000	13.71	0	0
	16	-15	0	221%	13.29	0.000	0.000	13.29	0	0
	17	-14	0	214%	12.86	0.000	0.000	12.86	0	0
	18	-13	0	207%	12.43	0.000	0.000	12.43	0	0
	19	-12	0	200%	12.00	0.000	0.000	12.00	0	0
	20	-11	0	193%	11.57	0.000	0.000	11.57	0	0
	21	-10	0	186%	11.14	0.000	0.000	11.14	0	0
	22	-9	0	179%	10.71	0.000	0.000	10.71	0	0
	23	-8	0	171%	10.29	0.000	0.000	10.29	0	0
A	24	-7	0	164%	9.86	0.000	0.000	9.86	0	0
	25	-6	0	157%	9.43	0.000	0.000	9.43	0	0
	26	-5	0	150%	9.00	0.000	0.000	9.00	0	0
	27	-4	0	143%	8.57	0.000	0.000	8.57	0	0
	28	-3	0	136%	8.14	0.000	0.000	8.14	0	0
	29	-2	0	129%	7.71	0.000	0.000	7.71	0	0
	30	-1	0	121%	7.29	0.000	0.000	7.29	0	0
	31	0	0	114%	6.86	0.000	0.000	6.86	0	0
	32	1	0	107%	6.43	0.000	0.000	6.43	0	0
TOL / B	33	2	3	100%	6.00	5.994	2.401	0.00	18	7
	34	3	22	93%	5.57	5.566	2.557	0.00	123	48
	35	4	63	86%	5.14	5.139	2.714	0.00	324	119
	36	5	63	79%	4.71	4.712	2.871	0.00	297	103
	37	6	175	71%	4.29	4.284	3.027	0.00	750	248
C	38	7	162	64%	3.86	3.857	3.184	0.00	625	196
	39	8	259	57%	3.43	3.429	3.472	0.00	888	256
	40	9	360	50%	3.00	3.000	3.760	0.00	1080	287
	41	10	428	43%	2.57	2.571	4.048	0.00	1101	272
	42	11	430	36%	2.14	2.143	4.336	0.00	921	212
D	43	12	503	29%	1.71	1.714	4.625	0.00	862	186
	44	13	444	21%	1.29	1.286	4.913	0.00	571	116
	45	14	384	14%	0.86	0.857	5.201	0.00	329	63
	46	15	294	7%	0.43	0.429	5.489	0.00	126	23
								Σ	8015	2138

Q_{H} = $P_{designh}$ × H_{HE}

= 8016 kWh

SCOPon = (Annual heating demand) / (Annual power input with electrical back up heater)

= 3.748 W/W

Q_{HE} = $Q_H/SCOP_{on}$ + H_{TO}×P_{TO} + H_{SB}×P_{SB} + H_{CK}×P_{CK} + H_{OFF}×P_{OFF}

= **2169.7** kWh

SCOP = Q_H / Q_{HE}

= **3.695** W/W

∑Fi = F(1) + F(2)

= 3 %

$\eta_{s\,(Tested)}$ = (100/CC) × SCOP - ΣF(i)

= **145.0%** **A++**

	Standby power		
	Pxx	Hxx	
		Heating only	Reversible
TO	41	754	754
SB	11	0	0
OFF	11	4416	0
CK	0	5170	754

MEPS -Heat

MEPS (26.09.2015~)		MEPS (26.09.2017~)	
Min η_s	Judge	**Min η_s**	Judge
100%	**OK**	110%	**OK**

(Labelled) $SCOP_{(rated)}$ **3.69** Q_{HE} **2170** $\eta_{s\,(Rated)}$ **145%** **A++**

APPENDIX A / Page 4 of 6 | Report No: ERP-P2021-00001

Performance Testing Data for SCOP (35°C) - Warmer

Condition	Outdoor air T (°C)	Part load ratio (%)	Part load (kW)	Water outlet temperature (°C)	Declared Capacity (kW)	COP at DC	Cc	Cru	COP at PL
E (TOL)	2	100	7.00	35	0.0	0.00			0.00
A									
B	2	100	7.00	35	7.0	3.25	0.98	1.00	3.25
C	7	64	4.50	31	4.4	5.16	0.95	1.00	5.16
D	12	29	2.00	26	3.4	7.45	0.91	0.58	7.00
F (Tbiv)	2	100	7.00	35	7.0	3.25			3.25

Condition	Bin j	Outdoor air temp. Tj	Hours hj	Part load ratio (%)	Heat demand Ph(tj) (kW)	Heating capacity of the heat pump (kW)	COP(Tj)	Electric back up heater elbu(Tj) (kW)	Annual heating demand hj*Ph(Tj) (kWh)	Annual power input with electrical back up heater (kWh)
	9	-22	0	271%	19.00	0.000	0.000	19.00	0	0
	10	-21	0	264%	18.50	0.000	0.000	18.50	0	0
	11	-20	0	257%	18.00	0.000	0.000	18.00	0	0
	12	-19	0	250%	17.50	0.000	0.000	17.50	0	0
	13	-18	0	243%	17.00	0.000	0.000	17.00	0	0
	14	-17	0	236%	16.50	0.000	0.000	16.50	0	0
	15	-16	0	229%	16.00	0.000	0.000	16.00	0	0
	16	-15	0	221%	15.50	0.000	0.000	15.50	0	0
	17	-14	0	214%	15.00	0.000	0.000	15.00	0	0
	18	-13	0	207%	14.50	0.000	0.000	14.50	0	0
	19	-12	0	200%	14.00	0.000	0.000	14.00	0	0
	20	-11	0	193%	13.50	0.000	0.000	13.50	0	0
	21	-10	0	186%	13.00	0.000	0.000	13.00	0	0
	22	-9	0	179%	12.50	0.000	0.000	12.50	0	0
	23	-8	0	171%	12.00	0.000	0.000	12.00	0	0
A	24	-7	0	164%	11.50	0.000	0.000	11.50	0	0
	25	-6	0	157%	11.00	0.000	0.000	11.00	0	0
	26	-5	0	150%	10.50	0.000	0.000	10.50	0	0
	27	-4	0	143%	10.00	0.000	0.000	10.00	0	0
	28	-3	0	136%	9.50	0.000	0.000	9.50	0	0
	29	-2	0	129%	9.00	0.000	0.000	9.00	0	0
	30	-1	0	121%	8.50	0.000	0.000	8.50	0	0
	31	0	0	114%	8.00	0.000	0.000	8.00	0	0
	32	1	0	107%	7.50	0.000	0.000	7.50	0	0
TOL / B	33	2	3	100%	7.00	6.970	3.246	0.00	21	6
	34	3	22	93%	6.50	6.476	3.629	0.00	143	39
	35	4	63	86%	6.00	5.982	4.012	0.00	378	94
	36	5	63	79%	5.50	5.488	4.394	0.00	347	79
	37	6	175	71%	5.00	4.994	4.777	0.00	875	183
C	38	7	162	64%	4.50	4.500	5.159	0.00	729	141
	39	8	259	57%	4.00	4.000	5.528	0.00	1036	187
	40	9	360	50%	3.50	3.500	5.897	0.00	1260	214
	41	10	428	43%	3.00	3.000	6.265	0.00	1284	205
	42	11	430	36%	2.50	2.500	6.634	0.00	1075	162
D	43	12	503	29%	2.00	2.000	7.003	0.00	1006	144
	44	13	444	21%	1.50	1.500	7.372	0.00	666	90
	45	14	384	14%	1.00	1.000	7.740	0.00	384	50
	46	15	294	7%	0.50	0.500	8.109	0.00	147	18
								Σ	9351	1613

$Q_{H=}$ = $P_{designh}$ x H_{HE}

= 9352 kWh

SCOPon = (Annual heating demand) / (Annual power input with electrical back up heater)

= 5.796 W/W

Q_{HE} = $Q_H/SCOP_{on}$ +$H_{TO}xP_{TO}$+$H_{SB}xP_{SB}$+$H_{CK}xP_{CK}$+$H_{OFF}xP_{OFF}$

= **1644.4** kWh

SCOP = Q_H / Q_{HE}

= **5.687** W/W

∑Fi = F(1) + F(2)

= 3 %

$\eta_{s\ (Tested)}$ = (100/CC) × SCOP - ΣF(i)

= **224.0%** **A++**

	Standby power		
	Pxx	Hxx	
		Heating only	Reversible
TO	41	754	754
SB	11	0	0
OFF	11	4416	0
CK	0	5170	754

MEPS -Heat

MEPS (26.09.2015~)		MEPS (26.09.2017~)	
Min η_s	Judge	**Min η_s**	Judge
100%	**OK**	110%	**OK**

(Labelled)

$SCOP_{(rated)}$ **5.69** Q_{HE} **1644** $\eta_{s\ (Rated)}$ **224%** **A+++**

APPENDIX A / Page 5 of 6 | Report No: ERP-P2021-00001

Performance Testing Data for SCOP (55°C) - Colder

Condition	Outdoor air T (°C)	Part load ratio (%)	Part load (kW)	Water outlet temperature (°C)	Declared Capacity (kW)	COP at DC	Cc	Cru	COP at PL
E (TOL)	-15	82	4.89	49	4.9	1.85			1.85
G	-15	82	4.89	49	4.8	1.85	0.98	1.00	1.85
A	-7	61	3.63	44	3.6	2.43	0.97	1.00	2.43
B	2	37	2.21	37	2.2	3.46	0.94	0.99	3.46
C	7	24	1.42	32	2.7	4.68	0.93	0.54	4.41
D	12	11	0.63	28	3.2	6.80	0.91	0.20	5.02
F (Tbiv)	-15	82	4.89	49	4.8	1.85			1.85

Condition	Bin j	Outdoor air temp. Tj	Hours hj	Part load ratio (%)	Heat demand Ph(tj) (kW)	Heating capacity of the heat pump (kW)	COP(Tj)	Electric back up heater elbu(Tj) (kW)	Annual heating demand hj*Ph(Tj) (kWh)	Annual power input with electrical back up heater (kWh)
TOL	9	-22	1	100%	6.00	0.000	0.000	6.00	6	6
	10	-21	6	97%	5.84	0.000	0.000	5.84	35	35
	11	-20	13	95%	5.68	0.000	0.000	5.68	74	74
	12	-19	17	92%	5.53	0.000	0.000	5.53	94	94
	13	-18	19	89%	5.37	0.000	0.000	5.37	102	102
	14	-17	26	87%	5.21	0.000	0.000	5.21	135	135
	15	-16	39	84%	5.05	0.000	0.000	5.05	197	197
F / G	16	-15	41	82%	4.89	4.863	1.852	0.00	201	108
	17	-14	35	79%	4.74	4.709	1.925	0.00	166	86
	18	-13	52	76%	4.58	4.555	1.998	0.00	238	119
	19	-12	37	74%	4.42	4.401	2.070	0.00	164	79
	20	-11	41	71%	4.26	4.247	2.143	0.00	175	82
	21	-10	43	68%	4.11	4.093	2.216	0.00	177	80
	22	-9	54	66%	3.95	3.939	2.289	0.00	213	93
	23	-8	90	63%	3.79	3.786	2.361	0.00	341	144
A	24	-7	125	61%	3.63	3.632	2.434	0.00	454	186
	25	-6	169	58%	3.47	3.474	2.548	0.00	587	230
	26	-5	195	55%	3.32	3.316	2.662	0.00	647	243
	27	-4	278	53%	3.16	3.158	2.776	0.00	878	316
	28	-3	306	50%	3.00	3.000	2.890	0.00	918	318
	29	-2	454	47%	2.84	2.842	3.004	0.00	1290	430
	30	-1	385	45%	2.68	2.684	3.118	0.00	1033	331
	31	0	490	42%	2.53	2.526	3.232	0.00	1238	383
	32	1	533	39%	2.37	2.368	3.346	0.00	1262	377
B	33	2	380	37%	2.21	2.211	3.459	0.00	840	243
	34	3	228	34%	2.05	2.053	3.649	0.00	468	128
	35	4	261	32%	1.89	1.895	3.839	0.00	495	129
	36	5	279	29%	1.74	1.737	4.028	0.00	485	120
	37	6	229	26%	1.58	1.579	4.218	0.00	362	86
C	38	7	269	24%	1.42	1.421	4.408	0.00	382	87
	39	8	233	21%	1.26	1.263	4.531	0.00	294	65
	40	9	230	18%	1.11	1.105	4.654	0.00	254	55
	41	10	243	16%	0.95	0.947	4.778	0.00	230	48
	42	11	191	13%	0.79	0.789	4.901	0.00	151	31
D	43	12	146	11%	0.63	0.632	5.025	0.00	92	18
	44	13	150	8%	0.47	0.474	5.148	0.00	71	14
	45	14	97	5%	0.32	0.316	5.272	0.00	31	6
	46	15	61	3%	0.16	0.158	5.395	0.00	10	2
								Σ	14789	5281

$Q_{H=} = P_{designh} \times H_{HE}$

= 14790 kWh

SCOPon = (Annual heating demand) / (Annual power input with electrical back up heater)

= 2.800 W/W

$Q_{HE} = Q_H/SCOP_{on} + H_{TO}xP_{TO} + H_{SB}xP_{SB} + H_{CK}xP_{CK} + H_{OFF}xP_{OFF}$

= **5285.8** kWh

SCOP = Q_H / Q_{HE}

= **2.798** W/W

∑Fi = F(1) + F(2)

= 3 %

$\eta_{s\ (Tested)}$ = (100/CC) × SCOP - ∑F(i)

= **109%** **A+**

	Standby power		
	Pxx	Hxx	
		Heating only	Reversible
TO	41	106	106
SB	11	0	0
OFF	11	2208	0
CK	0	2314	106

MEPS -Heat

MEPS (26.09.2015~)		MEPS (26.09.2017~)	
Min η_s	Judge	**Min η_s**	Judge
100%	**OK**	110%	**NG**

(Labelled) $SCOP_{(rated)}$ **2.80** Q_{HE} **5289** $\eta_{s\ (Rated)}$ **109%** **A+**

APPENDIX A / Page 6 of 6 | Report No: ERP-P2021-00001

Performance Testing Data for SCOP (35°C) - Colder

Condition	Outdoor air T (°C)	Part load ratio (%)	Part load (kW)	Water outlet temperature (°C)	Declared Capacity (kW)	COP at DC	Cc	Cru	COP at PL
E (TOL)	-15	82	4.89	32	3.5	1.85			1.85
G	-15	82	4.89	32	4.9	2.56	0.98	1.00	2.56
A	-7	61	3.63	30	3.6	3.06	0.97	1.00	3.06
B	2	37	2.21	27	2.3	4.95	0.91	0.98	4.95
C	7	24	1.42	25	2.9	6.18	0.91	0.50	5.67
D	12	11	0.63	24	3.2	8.65	0.89	0.19	5.96
F (Tbiv)	-15	82	4.89	32	4.9	2.56			2.56

Condition	Bin j	Outdoor air temp. Tj	Hours hj	Part load ratio (%)	Heat demand Ph(tj) (kW)	Heating capacity of the heat pump (kW)	COP(Tj)	Electric back up heater elbu(Tj) (kW)	Annual heating demand hj*Ph(Tj) (kWh)	Annual power input with electrical back up heater (kWh)
TOL	9	-22	1	100%	6.00	0.000	0.000	6.00	6	6
	10	-21	6	97%	5.84	0.000	0.000	5.84	35	35
	11	-20	13	95%	5.68	0.000	0.000	5.68	74	74
	12	-19	17	92%	5.53	0.000	0.000	5.53	94	94
	13	-18	19	89%	5.37	0.000	0.000	5.37	102	102
	14	-17	26	87%	5.21	0.000	0.000	5.21	135	135
	15	-16	39	84%	5.05	0.000	0.000	5.05	197	197
F / G	16	-15	41	82%	4.89	4.863	2.562	0.00	201	78
	17	-14	35	79%	4.74	4.709	2.624	0.00	166	63
	18	-13	52	76%	4.58	4.555	2.687	0.00	238	89
	19	-12	37	74%	4.42	4.401	2.750	0.00	164	59
	20	-11	41	71%	4.26	4.247	2.813	0.00	175	62
	21	-10	43	68%	4.11	4.093	2.876	0.00	177	61
	22	-9	54	66%	3.95	3.939	2.939	0.00	213	73
	23	-8	90	63%	3.79	3.786	3.002	0.00	341	114
A	24	-7	125	61%	3.63	3.632	3.064	0.00	454	148
	25	-6	169	58%	3.47	3.474	3.274	0.00	587	179
	26	-5	195	55%	3.32	3.316	3.484	0.00	647	186
	27	-4	278	53%	3.16	3.158	3.694	0.00	878	238
	28	-3	306	50%	3.00	3.000	3.904	0.00	918	235
	29	-2	454	47%	2.84	2.842	4.114	0.00	1290	314
	30	-1	385	45%	2.68	2.684	4.324	0.00	1033	239
	31	0	490	42%	2.53	2.526	4.535	0.00	1238	273
	32	1	533	39%	2.37	2.368	4.745	0.00	1262	266
B	33	2	380	37%	2.21	2.211	4.955	0.00	840	170
	34	3	228	34%	2.05	2.053	5.098	0.00	468	92
	35	4	261	32%	1.89	1.895	5.242	0.00	495	94
	36	5	279	29%	1.74	1.737	5.386	0.00	485	90
	37	6	229	26%	1.58	1.579	5.530	0.00	362	65
C	38	7	269	24%	1.42	1.421	5.673	0.00	382	67
	39	8	233	21%	1.26	1.263	5.731	0.00	294	51
	40	9	230	18%	1.11	1.105	5.788	0.00	254	44
	41	10	243	16%	0.95	0.947	5.845	0.00	230	39
	42	11	191	13%	0.79	0.789	5.902	0.00	151	26
D	43	12	146	11%	0.63	0.632	5.959	0.00	92	15
	44	13	150	8%	0.47	0.474	6.017	0.00	71	12
	45	14	97	5%	0.32	0.316	6.074	0.00	31	5
	46	15	61	3%	0.16	0.158	6.131	0.00	10	2
								Σ	14789	4093

Q_{H} = $P_{designh}$ x H_{HE}

= 14790 kWh

SCOPon = (Annual heating demand) / (Annual power input with electrical back up heater)

= 3.613 W/W

Q_{HE} = $Q_H/SCOP_{on}$ + $H_{TO}xP_{TO}$+$H_{SB}xP_{SB}$+$H_{CK}xP_{CK}$+$H_{OFF}xP_{OFF}$

= **4097.3** kWh

SCOP = Q_H / Q_{HE}

= **3.610** W/W

∑Fi = F(1) + F(2)

= 3 %

$\eta_{s\ (Tested)}$ = (100/CC) × SCOP - ΣF(i)

= **141.0%** **A++**

	Standby power		
	Pxx	Hxx	
		Heating only	Reversible
TO	41	106	106
SB	11	0	0
OFF	11	2208	0
CK	0	2314	106

MEPS -Heat

MEPS (26.09.2015~)		MEPS (26.09.2017~)	
Min η_s	Judge	**Min η_s**	Judge
100%	**OK**	110%	**OK**

(Labelled) $SCOP_{(rated)}$ **3.61** Q_{HE} **4101** $\eta_{s\ (Rated)}$ **141%** **A+**