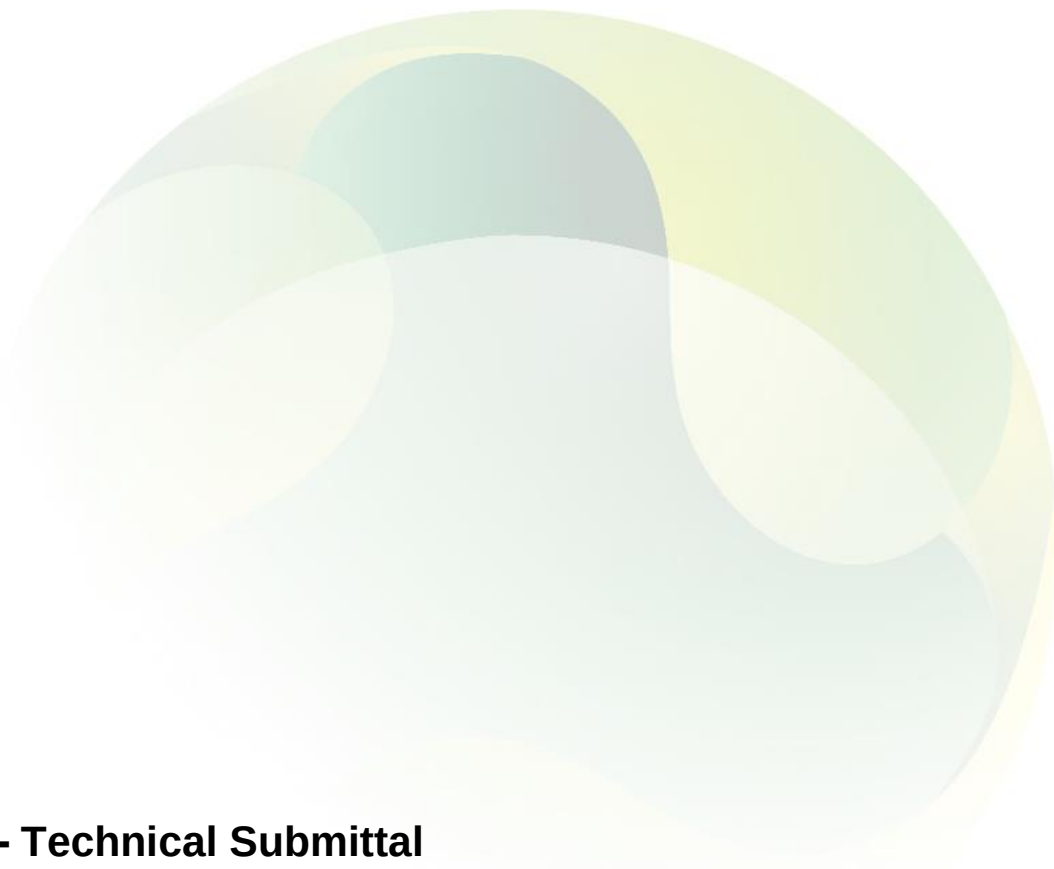




Air Conditioning – Technical Submittal

Project: Unite, Kincardine
Project No: MC1158
TSM No: 500991-AME-ZZ-XX-TS-M-5501
Revision: P01
Status: for comment and approval
Date: 4th November 2021

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CARBONCONSULTANTS



ameon
Building Services Engineering

Air Conditioning - Technical Submittal

Project Unite, Kincardine
Project No. MC1158
Tech Submittal No. 500991-AME-ZZ-XX-TS-M-5501
Revision P01
Date 04/11/2021



Indoor Unit Schedule

Ref.	Level	Room	Manufacturer	Model	Description	Total Cooling (W)	Total Heating (W)	Weight (kg)	Width (mm)	Depth (mm)	Height (mm)	Condenser Ref.
AC/01	GF	Study Room	Toshiba	RAV-RM561UTP-E	Toshiba Digital Inverter R32 Cassette Indoor 5.6kW	5,000	5,300	20.0	840.0	840.0	256.0	CD/01
AC/02	GF	Common Room	Toshiba	RAV-RM561UTP-E	Toshiba Digital Inverter R32 Cassette Indoor 5.6kW	5,000	5,300	20.0	840.0	840.0	256.0	CD/02
AC/03	GF	Common Room	Toshiba	RAV-RM561UTP-E	Toshiba Digital Inverter R32 Cassette Indoor 5.6kW	5,000	5,300	20.0	840.0	840.0	256.0	CD/02

Notes:

- 1) Each room to have RBC-AMSU51-EN wall mounted local controller
- 2)
- 3)
- 4)
- 5)

Air Conditioning - Technical Submittal

Project Unite, Kincardine
Project No. MC1158
TSM No. 500991-AME-ZZ-XX-TS-M-5501
Revision P01
Date 04/11/2021



Condenser Unit Schedule

Ref.	Location	Manufacturer	Model	Description	Total Cooling (W)	Total Heating (W)	Weight (kg)	Width (mm)	Depth (mm)	Height (mm)	Serving
CD/01	GF - Courtyard	Toshiba	RAV-GP561ATP-E	Toshiba R32 Super Digital Inverter Condensing Unit 2.2-5.6kW	5000	5600	45.0	799.0	299.0	630.0	AC/01
CD/02	GF - Courtyard	Toshiba	RAV-GP1101ATP-E	Toshiba R32 Super Digital Inverter Condensing Unit 2.2-10.6kW	10000	11200	104.0	1010.0	370.0	1550.0	AC/02+03

Notes:

- 1)
- 2)
- 3)
- 4)
- 5)

Toshiba Air Conditioning - RAV-RM Data Sheet

RAV-RM561UTP-E 4-Way Cassette

Features

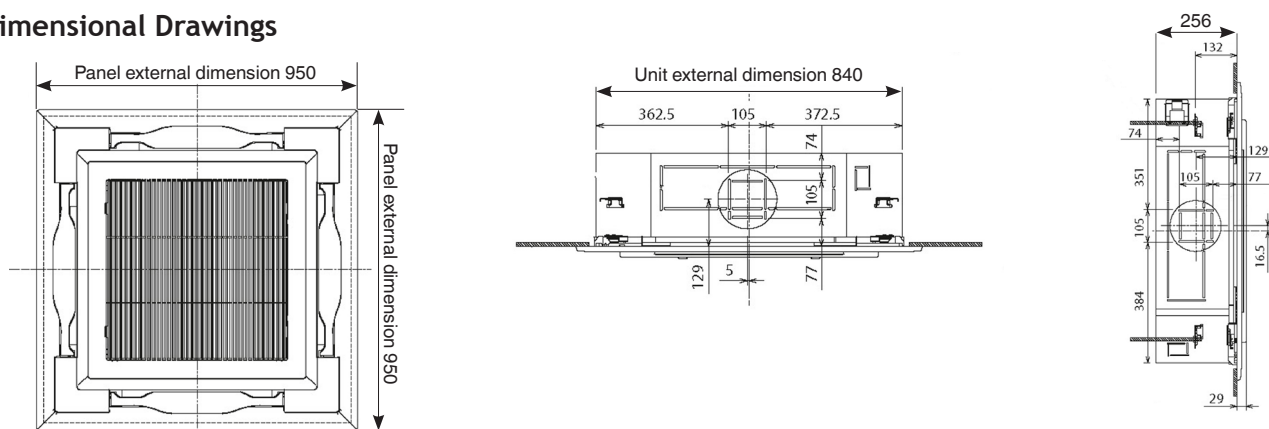
- Redesigned for use with refrigerant R32
- Self-cleaning function
- Lift pump up to 850 mm lift
- Individual setting of louvre position
- Wireless remote control and optional wired remote controller and timer



Technical Data

Model reference			RAV-RM561UTP-E
Nominal	Cooling Capacity	kW	5.0
	Heating Capacity	kW	5.3
	EER/COP	W/W	3.21/3.9
UK	Cooling Total/Sensible	kW	4.80/3.60
	Heating	kW	3.79
Cooling EN14825	Range Min. - Max.	kW	1.5 - 5.6
	Power Input	kW	1.56
	Pdesign	kW	5.0
	SEER/Energy Efficiency Class		6.34/A++
Heating EN14825	Seasonal Energy Consumption	kWh/a	285
	Range Min. - Max.	kW	1.5 - 6.3
	Power Input	kW	1.36
	Pdesign	kW	2.8
	SCOP/Energy Efficiency Class		4.60/A+
Air Flow	Seasonal Energy Consumption	kWh/a	1459
	High - Medium - Low	l/s	292 - 242 - 217
	High - Medium - Low	m³/h	1050 - 870 - 780
Sound	Pressure High - Medium - Low	dB(A)	32 - 29 - 28
	Power High - Medium - Low	dB(A)	47 - 44 - 43
Unit	Height x Width x Depth	mm	256 x 840 x 840
	Weight	kg	20
Panel	Height x Width x Depth	mm	30 x 950 x 950
	Weight RBC-UM31PGP(W)-E	kg	4.2
Pipe Connection	Flare Connections (gas - liquid)	inch	1/2 - 1/4
	Drain Pipe Connection OD/ID	mm	VP32/25
Remote Controller			RBC-AMT32E
Power Cable			Outdoor to Indoor
			3 core + earth

Dimensional Drawings



Cool Designs Ltd

Raising the Standards in Air Conditioning Distribution

www.cdlweb.info



All UK duties are based on Cooling Indoor air temperature 22°C DB/16°C WB Outdoor air temperature 28°C DB 50% RH, high fan speed, 5 m pipe run.
Heating Indoor air temperature 20°C DB Outdoor air temperature -5°C DB 100% RH, high fan speed, 5 m pipe run. Values are based on the maximum compressor output.
Data obtained from Toshiba Air Conditioning Published Data July 2018.

Toshiba Air Conditioning - RAV-GP Data Sheet

RAV-GP561ATP-E Outdoor Unit

Features

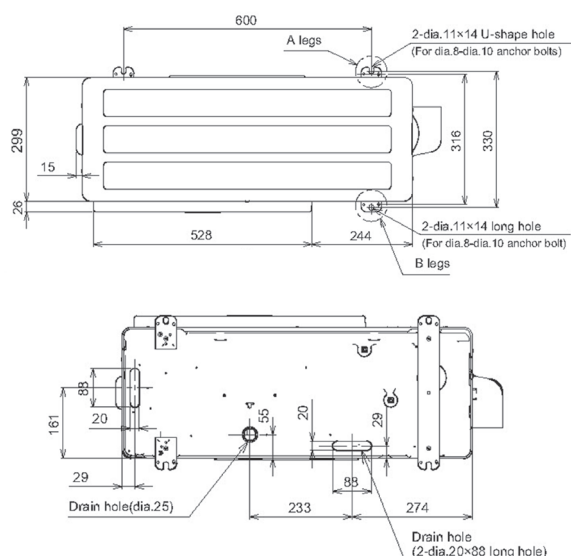
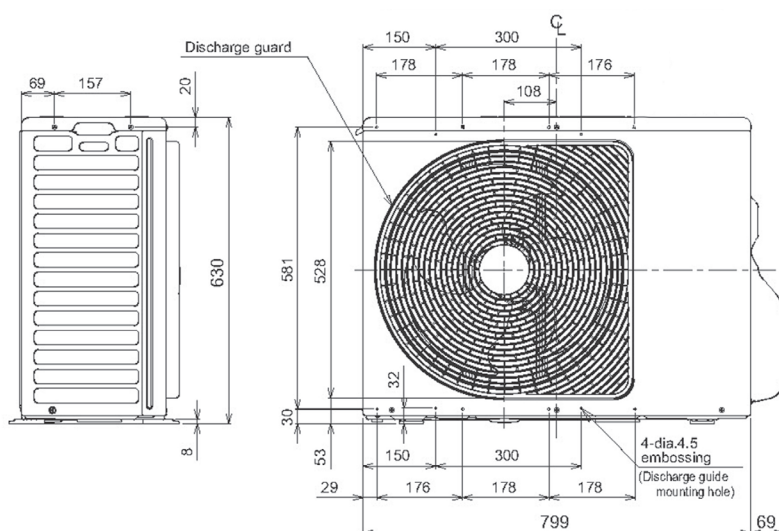
- Redesigned for use with refrigerant R32
- Wide operating range (cooling mode -15°C to +52°C)
- Auto-diagnostic function
- Flexible, can be utilised for single, twin, triple indoor applications
- Compact size



Technical Data

Model reference			RAV-GP561ATP-E
Nominal	Cooling Capacity	kW	5.0
	Heating Capacity	kW	5.6
Operating Range	Cooling/Heating	°C	-15 to 52/-27 to 15
Air Flow	High	m³/h - l/s	2250 - 625
Sound	Pressure High Cooling/Heating	dB(A)	46/48
	Power High Cooling/Heating	dB(A)	63/65
Unit	Height x Width x Depth	mm	630 x 799 x 299
	Weight	kg	45
Pipe Connection	Flare Connections (gas - liquid)	inch	1/2 - 1/4
	Min.-Max. Length	m	3-50
	Maximum Height Difference	m	±30
	Drain Port Connection	mm	16
Refrigerant R32	Base Charge/Chargeless Length	kg/m	1.35/20
	Additional Charge Liquid Side	g/m	20
Run Current	Maximum	A	7.66
Power Cable	Outdoor to Indoor		3 core + earth
Power Supply	Suggested Fuse Size	V/ph/Hz-A	220-240/1/50-16

Dimensional Drawings



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All UK duties are based on Cooling Indoor air temperature 22°C DB/16°C WB Outdoor air temperature 28°C DB 50% RH, high fan speed, 5 m pipe run.
Heating Indoor air temperature 20°C DB Outdoor air temperature -5°C DB 100% RH, high fan speed, 5 m pipe run. Values are based on the maximum compressor output.
Data obtained from Toshiba Air Conditioning Published Data July 2018.

Toshiba Air Conditioning - RAV-GP Data Sheet

RAV-GP1101AT-E Outdoor Unit

Features

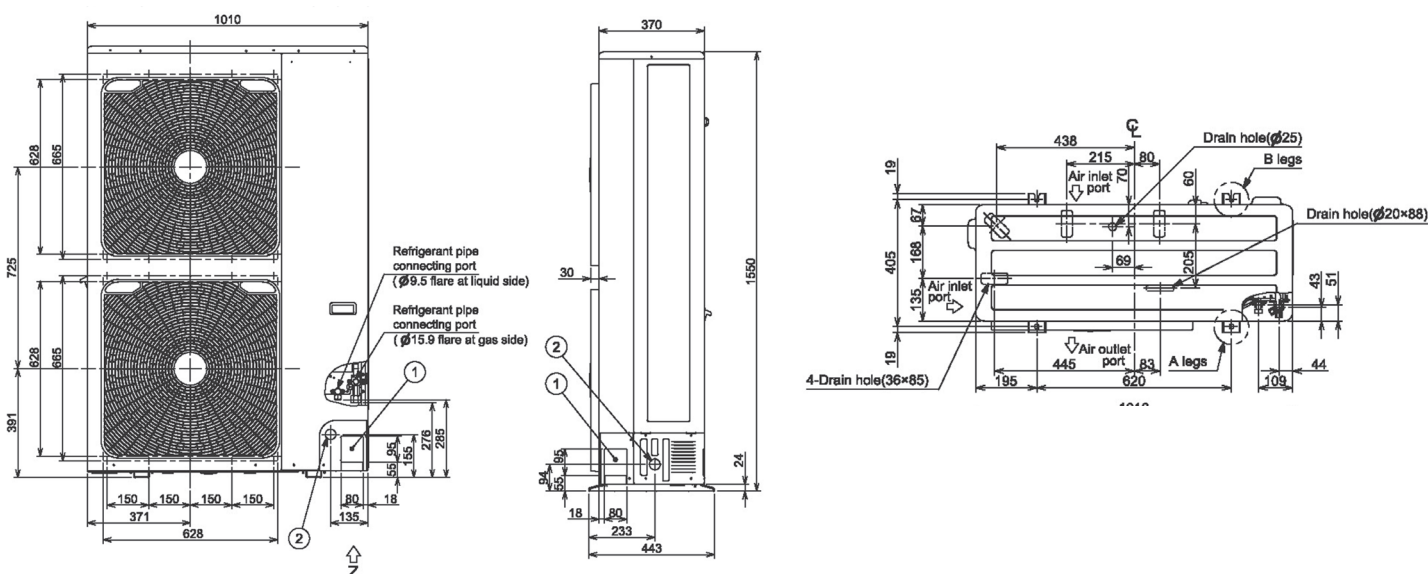
- Redesigned for use with refrigerant R32
- Wide operating range (cooling mode -15°C to +52°C)
- Auto-diagnostic function
- Flexible, can be utilised for single, twin, triple indoor applications
- Compact size



Technical Data

Model reference			RAV-GP1101AT-E
Nominal	Cooling Capacity	kW	10.0
	Heating Capacity	kW	11.2
Operating Range	Cooling/Heating	°C	-15 to 52/-27 to 15
Air Flow	High	m³/h - l/s	6960 - 1934
Sound	Pressure High Cooling/Heating	dB(A)	49/50
	Power High Cooling/Heating	dB(A)	66/67
Unit	Height x Width x Depth	mm	1550 x 1010 x 370
	Weight	kg	104
	Pipe Connection	Flare Connections (gas - liquid)	inch 5/8 - 3/8
Refrigerant R32	Min.-Max. Length	m	3-75
	Maximum Height Difference	m	±30
	Drain Port Connection	mm	16
	Base Charge/Chargeless Length	kg/m	3.1/30
Run Current	Additional Charge Liquid Side	g/m	35
	Maximum	A	10.43
Power Cable	Outdoor to Indoor		3 core + earth
Power Supply	Suggested Fuse Size	V/ph/Hz-A	220-240/1/50-20

Dimensional Drawings



Cool Designs Ltd

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All UK duties are based on Cooling Indoor air temperature 22°C DB/16°C WB Outdoor air temperature 28°C DB 50% RH, high fan speed, 5 m pipe run.
Heating Indoor air temperature 20°C DB Outdoor air temperature -5°C DB 100% RH, high fan speed, 5 m pipe run. Values are based on the maximum compressor output.
Data obtained from Toshiba Air Conditioning Published Data July 2018.

Unit 4 Paramount Business Park, Wilson Road
L36 6AW
01514806161

Date 24th Sep 2021

Project KINCARDINE COURT

Project no. L1486

Engineer CA

Checked by

Date checked

File Z:\Jobs\L1486 Unite, Kincardine\HEVA\

Design basis

Location Manchester Design day 15 July No external shading is considered
 Resultant room design temperatures used, no room heat losses are added to project totals
 Supply air temp 12 °C Local fresh air 10 l/s/person
 No fixed temperature air is included
 Fins are considered
 Outside 28 dry bulb/19.1 wet bulb, Room temperatures not allowed to rise

Rooms included : 2 rooms selected

Results for room 0CR COMMON ROOM **No. off** 1

Sun time	Outside temp	Solar load (W)	Fabric load (W)	Convective load (W)	Latent load (W)	Casual load (W)	Total load (W)
1.00	15.1	285	337	-932	395	1694	1778
2.00	13.6	285	306	-1159	344	1694	1470
3.00	12.5	285	274	-1329	312	1694	1237
4.00	11.9	285	245	-1430	295	1694	1089
5.00	11.7	285	224	-1456	291	1694	1038
6.00	12.1	304	222	-1391	302	1694	1132
7.00	13.2	401	235	-1230	331	1694	1431
8.00	14.7	481	255	-986	382	1694	1826
9.00	16.7	551	280	-679	461	1694	2306
10.00	18.9	622	309	-333	569	1694	2861
11.00	21.2	703	338	26	704	1694	3465
12.00	23.3	792	365	368	857	1694	4077
13.00	25.3	1191	390	667	1011	1694	4952
14.00	26.7	1726	413	899	1143	1694	5875
15.00	27.7	2165	428	1046	1234	1694	6568
16.00	28	2462	436	1097	1266	1694	6955
17.00	27.8	2567	437	1059	1242	1694	6998 peak
18.00	27	2438	432	947	1172	1694	6683
19.00	25.9	2075	421	768	1067	1694	6025
20.00	24.4	1530	415	533	939	1694	5112
21.00	22.6	921	410	256	804	1694	4085
22.00	20.7	438	399	-48	674	1694	3159
23.00	18.7	285	384	-359	560	1694	2564
24.00	16.8	285	363	-660	466	1694	2148

Peak room load 6998 W at 17.00 hrs (118.3 W/m² and 46 W/m³)

Solar load average 22.4 W/m² (7.30 to 17.30 hrs)

Supply air flow rate 0.533 m³/s Room design temperature 21 °C

Project KINCARDINE COURT

Results for room		0CR2	STUDY ROOM			No. off		1
Sun time	Outside temp	Solar load (W)	Fabric load (W)	Convective load (W)	Latent load (W)	Casual load (W)	Total load (W)	
1.00	15.1	92	148	-815	373	1491	1288	
2.00	13.6	92	138	-1014	329	1491	1035	
3.00	12.5	92	129	-1162	301	1491	850	
4.00	11.9	92	122	-1251	286	1491	739	
5.00	11.7	92	117	-1274	282	1491	708	
6.00	12.1	149	116	-1217	292	1491	830	
7.00	13.2	507	119	-1076	317	1491	1358	
8.00	14.7	818	126	-863	362	1491	1934	
9.00	16.7	927	136	-594	430	1491	2390	
10.00	18.9	865	147	-291	525	1491	2736	
11.00	21.2	684	158	23	644	1491	2999	
12.00	23.3	443	170	322	777	1491	3203	
13.00	25.3	335	183	584	912	1491	3504	
14.00	26.7	316	205	787	1028	1491	3826	
15.00	27.7	299	224	915	1107	1491	4036	
16.00	28	286	231	959	1135	1491	4102 peak	
17.00	27.8	272	230	926	1114	1491	4033	
18.00	27	255	222	829	1053	1491	3849	
19.00	25.9	234	210	672	961	1491	3568	
20.00	24.4	208	200	467	849	1491	3215	
21.00	22.6	174	192	224	731	1491	2812	
22.00	20.7	127	182	-42	618	1491	2375	
23.00	18.7	92	171	-314	517	1491	1956	
24.00	16.8	92	160	-577	435	1491	1600	

Peak room load 4102 W at 16.00 hrs (173.5 W/m² and 67.5 W/m³)

Solar load average 22.2 W/m² (7.30 to 17.30 hrs)

Supply air flow rate 0.2747 m³/s Room design temperature 21 °C

Project KINCARDINE COURT

Design basis

Location Manchester Design day 15 July No external shading is considered
 Resultant room design temperatures used, no room heat losses are added to project totals
 Supply air temp 12 °C Local fresh air 10 l/s/person
 No fixed temperature air is included
 Fins are considered
 Outside 28 dry bulb/19.1 wet bulb, Room temperatures not allowed to rise
 Rooms included : 2 rooms selected

Project total results

* Sensible fresh air load excluded

Sun time	Outside temp	Building loads		Fresh air loads		Plant total loads		
(hrs)	(°C)	Sensible (kW)	Latent (kW)	Sensible (kW)	Latent (kW)	Sensible (kW)	Latent (kW)	Total (kW)
1.00	15.1	2.3	0.77	0	0	2.3	0.77	3.07
2.00	13.6	1.83	0.67	0	0	1.83	0.67	2.51
3.00	12.5	1.47	0.61	0	0	1.47	0.61	2.09
4.00	11.9	1.25	0.58	0	0	1.25	0.58	1.83
5.00	11.7	1.17	0.57	0	0	1.17	0.57	1.75
6.00	12.1	1.37	0.59	0	0	1.37	0.59	1.96
7.00	13.2	2.14	0.65	0	0	2.14	0.65	2.79
8.00	14.7	3.02	0.74	0	0	3.02	0.74	3.76
9.00	16.7	3.81	0.89	0	0	3.81	0.89	4.7
10.00	18.9	4.5	1.09	0	0	4.5	1.09	5.6
11.00	21.2	5.12	1.35	0	0	5.12	1.35	6.46
12.00	23.3	5.64	1.63	0	0	5.64	1.63	7.28
13.00	25.3	6.53	1.92	0	0	6.53	1.92	8.46
14.00	26.7	7.53	2.17	0	0	7.53	2.17	9.7
15.00	27.7	8.26	2.34	0	0	8.26	2.34	10.6
16.00	28	8.66	2.4	0	0	8.66	2.4	11.06 peak
17.00	27.8	8.68	2.36	0	0	8.68	2.36	11.03
18.00	27	8.31	2.23	0	0	8.31	2.23	10.53
19.00	25.9	7.56	2.03	0	0	7.56	2.03	9.59
20.00	24.4	6.54	1.79	0	0	6.54	1.79	8.33
21.00	22.6	5.36	1.54	0	0	5.36	1.54	6.9
22.00	20.7	4.24	1.29	0	0	4.24	1.29	5.53
23.00	18.7	3.44	1.08	0	0	3.44	1.08	4.52
24.00	16.8	2.85	0.9	0	0	2.85	0.9	3.75

Peak coincident plant load **11.06 kW** at **16.00 hrs** (**133.5 W/m²** and **52 W/m³**)
 Supply air flow rate **0.8077 m³/s** Fresh air flow rate **0 m³/s** (Total **23 occupants**)