

Design Weather Parameters & MSHGs

02-13-2024
02:11PM

Design Parameters:

City Name	Melbourne	
Location	Australia	
Latitude	-37.8	Deg.
Longitude	-144.8	Deg.
Elevation	35.0	m
Summer Design Dry-Bulb	34.5	°C
Summer Coincident Wet-Bulb	21.0	°C
Summer Daily Range	11.5	K
Winter Design Dry-Bulb	4.5	°C
Winter Design Wet-Bulb	0.9	°C
Atmospheric Clearness Number	1.00	
Average Ground Reflectance	0.20	
Soil Conductivity	1.385	W/(m K)
Local Time Zone (GMT +/- N hours)	-10.0	hours
Consider Daylight Savings Time	No	
Simulation Weather Data	N/A	
Current Data is	1993 Carrier Australia	
Design Cooling Months	January to December	

Design Day Maximum Solar Heat Gains

(The MSHG values are expressed in W/m²)

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	362.7	439.2	597.7	719.8	772.7	710.4	578.5	366.3	136.9
February	504.2	562.9	676.4	739.4	744.7	641.9	444.0	233.4	123.1
March	626.8	663.4	729.2	739.1	677.1	531.2	295.2	100.0	100.0
April	695.0	710.2	718.9	676.4	541.8	374.4	135.3	75.9	75.9
May	711.2	705.8	679.6	600.1	439.7	244.8	59.6	59.6	59.6
June	707.7	697.8	660.5	554.5	400.2	174.9	52.3	52.3	52.3
July	706.2	701.8	676.9	588.3	438.2	222.1	56.7	56.7	56.7
August	688.4	702.5	711.5	671.2	533.7	368.5	131.2	69.9	69.9
September	606.0	649.1	717.6	733.7	676.2	514.4	321.4	90.6	90.6
October	488.7	553.6	662.9	745.6	726.4	639.1	463.7	208.4	112.2
November	354.1	432.8	584.6	719.2	758.7	722.5	577.5	352.1	130.3
December	303.0	381.5	551.7	702.6	763.1	742.9	621.5	404.6	171.5
Month	SSW	SW	WSW	W	WNW	NW	NNW	HOR	Mult
January	364.1	580.8	707.3	771.2	721.7	597.3	439.6	946.6	1.00
February	230.3	458.1	634.2	745.4	744.4	677.7	565.2	861.3	1.00
March	100.0	299.4	532.0	675.1	741.1	728.0	662.5	726.7	1.00
April	75.9	153.1	356.9	552.1	677.7	721.8	709.9	546.0	1.00
May	59.6	59.6	238.4	448.4	583.2	687.2	712.9	408.3	1.00
June	52.3	52.3	190.1	399.4	547.5	661.8	702.0	349.6	1.00
July	56.7	56.7	217.3	440.5	583.5	678.8	704.1	395.1	1.00
August	69.9	143.7	359.6	541.4	673.3	712.3	700.9	527.0	1.00
September	90.6	315.9	531.3	658.9	737.9	707.6	643.6	705.9	1.00
October	223.4	458.0	642.9	729.6	743.2	659.8	550.5	838.3	1.00
November	365.1	565.5	721.0	769.2	712.2	590.4	428.4	933.2	1.00
December	417.6	615.1	735.7	773.7	696.5	555.7	380.0	966.3	1.00

Mult. = User-defined solar multiplier factor.

Space Input Data

Westgate
gk

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Dock office First Floor

1. General Details:

Floor Area **119.0** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **99.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.4. People:

Occupancy **12.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

2.3. Electrical Equipment:

Wattage **3285.0** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
E	24.0	0	0	0
W	24.0	0	0	0
S	5.7	1	0	0

3.1. Construction Types for Exposure E

Wall Type **Exposed Wall**

3.2. Construction Types for Exposure W

Wall Type **Exposed Wall**

3.3. Construction Types for Exposure S

Wall Type **Exposed Wall**
 1st Window Type **W5 Dock Office FF-South**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	119.0	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s
Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **119.0** m²
 Total Floor U-Value **0.490** W/(m²·K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²·K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**

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Area 48.4 m²
U-Value 0.730 W/(m²-K)
Uncondit. Space Max Temp 24.0 °C
Ambient at Space Max Temp 35.0 °C
Uncondit. Space Min Temp 24.0 °C
Ambient at Space Min Temp 4.5 °C

7.2. 2nd Partition Details:
(No partition data).

Space Input Data

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Dock office Ground Floor

1. General Details:

Floor Area **73.0** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **63.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.4. People:

Occupancy **8.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

2.3. Electrical Equipment:

Wattage **1095.0** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
S	28.5	1	0	0

3.1. Construction Types for Exposure S

Wall Type **Exposed Wall**
 1st Window Type **W4 Dock Office GF-South**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	73.0	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s

Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **73.0** m²
 Total Floor U-Value **0.490** W/(m²-K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²-K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**
 Area **26.0** m²
 U-Value **0.730** W/(m²-K)
 Uncondit. Space Max Temp **24.0** °C
 Ambient at Space Max Temp **35.0** °C
 Uncondit. Space Min Temp **24.0** °C
 Ambient at Space Min Temp **4.5** °C

7.2. 2nd Partition Details:

(No partition data).

Space Input Data

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East Office

1. General Details:

Floor Area **468.6** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **OFFICE: Office space**
 OA Requirement 1 **2.5** L/s/person
 OA Requirement 2 **0.30** L/(s·m²)
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.4. People:

Occupancy **47.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

2.3. Electrical Equipment:

Wattage **11028.5** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	105.4	1	0	0
S	14.4	0	0	0
E	57.8	1	0	0
W	14.4	0	0	0

3.1. Construction Types for Exposure N

Wall Type **Exposed Wall**
 1st Window Type **W1 East Office-North**

3.2. Construction Types for Exposure S

Wall Type **Exposed Wall**

3.3. Construction Types for Exposure E

Wall Type **Exposed Wall**
 1st Window Type **W1 East Office-East**

3.4. Construction Types for Exposure W

Wall Type **Exposed Wall**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	468.6	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s

Infiltration occurs only when the fan is off.

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6. Floors:

Type	Slab Floor On Grade	
Floor Area	468.6	m ²
Total Floor U-Value	0.490	W/(m ² ·K)
Exposed Perimeter	0.0	m
Edge Insulation R-Value	0.00	(m ² ·K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type	Wall Partition	
Area	158.0	m ²
U-Value	0.730	W/(m ² ·K)
Uncondit. Space Max Temp	24.0	°C
Ambient at Space Max Temp	35.0	°C
Uncondit. Space Min Temp	24.0	°C
Ambient at Space Min Temp	4.5	°C

7.2. 2nd Partition Details:

(No partition data).

Space Input Data

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Kitchen

1. General Details:

Floor Area **16.0** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **32.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.3. Electrical Equipment:

Wattage **800.0** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

(No Wall, Window, Door data).

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	16.0	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s

Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **16.0** m²
 Total Floor U-Value **0.490** W/(m²·K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²·K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**
 Area **18.6** m²
 U-Value **0.730** W/(m²·K)
 Uncondit. Space Max Temp **24.0** °C
 Ambient at Space Max Temp **35.0** °C
 Uncondit. Space Min Temp **24.0** °C
 Ambient at Space Min Temp **4.5** °C

2.4. People:

Occupancy **3.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

7.2. 2nd Partition Details:

(No partition data).

Space Input Data

Westgate
gk

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Locker M/F/ First aid

1. General Details:

Floor Area **45.6** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **59.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.3. Electrical Equipment:

Wattage **0.0** Watts
 Schedule **None**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	22.0	0	0	0

3.1. Construction Types for Exposure N

Wall Type **Exposed Wall**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	45.6	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s
Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **45.6** m²
 Total Floor U-Value **0.490** W/(m²·K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²·K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**
 Area **44.0** m²
 U-Value **0.730** W/(m²·K)
 Uncondit. Space Max Temp **24.0** °C
 Ambient at Space Max Temp **35.0** °C
 Uncondit. Space Min Temp **24.0** °C
 Ambient at Space Min Temp **4.5** °C

7.2. 2nd Partition Details:

(No partition data).

Space Input Data

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Reception/ Print Mail

1. General Details:

Floor Area **57.1** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **33.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.3. Electrical Equipment:

Wattage **856.8** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

(No Wall, Window, Door data).

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	57.1	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s

Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **57.1** m²
 Total Floor U-Value **0.490** W/(m²-K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²-K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**
 Area **32.0** m²
 U-Value **0.730** W/(m²-K)
 Uncondit. Space Max Temp **24.0** °C
 Ambient at Space Max Temp **35.0** °C
 Uncondit. Space Min Temp **24.0** °C
 Ambient at Space Min Temp **4.5** °C

2.4. People:

Occupancy **2.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

7.2. 2nd Partition Details:

(No partition data).

Space Input Data

Westgate
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Staff Lunch

1. General Details:

Floor Area **149.4** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **344.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.4. People:

Occupancy **25.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

2.3. Electrical Equipment:

Wattage **600.0** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	55.0	1	0	0
S	5.6	0	0	0
W	57.8	1	0	0

3.1. Construction Types for Exposure N

Wall Type **Exposed Wall**
 1st Window Type **W3 Staff Lunch-North**

3.2. Construction Types for Exposure S

Wall Type **Exposed Wall**

3.3. Construction Types for Exposure W

Wall Type **Exposed Wall**
 1st Window Type **W3 Staff Lunch-West**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	149.4	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s
Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **149.4** m²
 Total Floor U-Value **0.490** W/(m²·K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²·K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**

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Area **31.0** m²
U-Value **0.730** W/(m²-K)
Uncondit. Space Max Temp **24.0** °C
Ambient at Space Max Temp **35.0** °C
Uncondit. Space Min Temp **24.0** °C
Ambient at Space Min Temp **4.5** °C

7.2. 2nd Partition Details:
(No partition data).

Space Input Data

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West Office

1. General Details:

Floor Area **418.0** m²
 Avg. Ceiling Height **2.7** m
 Building Weight **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage **User-Defined**
 OA Requirement 1 **345.0** L/s
 OA Requirement 2 **0.0** L/s
 Space Usage Defaults .. **ASHRAE Standard 62.1-2016**

2. Internals:

2.1. Overhead Lighting:

Fixture Type **Recessed (Unvented)**
 Wattage **10.00** W/m²
 Ballast Multiplier **1.00**
 Schedule **Lighting**

2.4. People:

Occupancy **42.0** People
 Activity Level **Office Work**
 Sensible **71.8** W/person
 Latent **60.1** W/person
 Schedule **People**

2.2. Task Lighting:

Wattage **0.00** W/m²
 Schedule **None**

2.5. Miscellaneous Loads:

Sensible **0** W
 Schedule **None**
 Latent **0** W
 Schedule **None**

2.3. Electrical Equipment:

Wattage **10269.3** Watts
 Schedule **Equipment**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	104.8	1	0	0
E	5.9	0	0	0
W	14.7	1	0	0

3.1. Construction Types for Exposure N

Wall Type **Exposed Wall**
 1st Window Type **W2 West Office-North**

3.2. Construction Types for Exposure E

Wall Type **Exposed Wall**

3.3. Construction Types for Exposure W

Wall Type **Exposed Wall**
 1st Window Type **W2 West Office-West**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	418.0	0	0

4.1. Construction Types for Exposure H

Roof Type **Roof with Insulation**

5. Infiltration:

Design Cooling **0.50** ACH
 Design Heating **0.50** ACH
 Energy Analysis **0.00** L/s
Infiltration occurs only when the fan is off.

6. Floors:

Type **Slab Floor On Grade**
 Floor Area **418.0** m²
 Total Floor U-Value **0.490** W/(m²·K)
 Exposed Perimeter **0.0** m
 Edge Insulation R-Value **0.00** (m²·K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type **Wall Partition**

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Area 155.0 m²
U-Value 0.730 W/(m²-K)
Uncondit. Space Max Temp 24.0 °C
Ambient at Space Max Temp 35.0 °C
Uncondit. Space Min Temp 24.0 °C
Ambient at Space Min Temp 4.5 °C

7.2. 2nd Partition Details:
(No partition data).

VRF-1 Input Data

Project Name: Westgate
Prepared by: gk

02-13-2024
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1. General Details:

Air System Name **VRF-1**
 Equipment Type **Terminal Units**
 Air System Type **Variable Refrigerant Flow (VRF)**
 Number of zones **8**
 Ventilation **Direct Ventilation**

2. Dedicated Outdoor Air System Components:

(Dedicated Outdoor Air System not used: no inputs)

3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
Dock office First Floor	x1
Zone 2: Zone 2	
Dock office Ground Floor	x1
Zone 3: Zone 3	
East Office	x1
Zone 4: Zone 4	
Kitchen	x1
Zone 5: Zone 5	
Locker M/F/ First aid	x1
Zone 6: Zone 6	
Reception/ Print Mail	x1
Zone 7: Zone 7	
Staff Lunch	x1
Zone 8: Zone 8	
West Office	x1

Thermostats and Zone Data:

Zone	Cooling T-Stat Occ. (°C)	Cooling T-Stat Unocc. (°C)	Heating T-Stat Occ. (°C)	Heating T-Stat Unocc. (°C)	T-Stat Throttling Range (°C)
1	22.5	22.5	21.1	18.3	0.83
2	22.5	22.5	21.1	18.3	0.83
3	22.5	22.5	21.1	18.3	0.83
4	22.5	22.5	21.1	18.3	0.83
5	22.5	22.5	21.1	18.3	0.83
6	22.5	22.5	21.1	18.3	0.83
7	22.5	22.5	21.1	18.3	0.83
8	22.5	22.5	21.1	18.3	0.83

Thermostat Schedule **Thermostat Schedule**
 Unoccupied Cooling is **Available**

Common Terminal Unit Data:

Cooling Coil:
 Design Supply Temp. **14.4** °C
 Coil Bypass Factor **0.100**
 Cooling Source **Air-Cooled DX**
 Schedule **JFMAMJJASOND**

Heating Coil:
 Design Supply Temp. **35.0** °C
 Heating Source **Air Source Heat Pump**
 Schedule **JFMAMJJASOND**

Fan Control **Fan On**
 Ventilation Sizing Method **Sum of Space OA Airflows**

Terminal Units Data:

VRF-1 Input Data

Project Name: Westgate
Prepared by: gk

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Zone	Terminal Type	Air Distribution	Air Distribution Effectiveness Specification	Air Distribution Effectiveness	Minimum Airflow	Fan Performance	Fan Efficiency	Design Supply Temp.
1	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
2	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
3	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
4	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
5	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
6	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
7	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-
8	Fan coil	Ceiling supply / ceiling return	Not Used	-	0.00 L/s/person	0 Pa	50 %	-

4. Sizing Data (Computer-Generated):

System Sizing Data:

Sizing Data:

Cooling Supply Temperature 14.4 °C
Heating Supply Temperature 35.0 °C

Hydronic Sizing Specifications:

Chilled Water Delta-T 5.6 K
Hot Water Delta-T 11.1 K

Safety Factors:

Cooling Sensible 10 %
Cooling Latent 10 %
Heating 10 %

Zone Sizing Data:

Zone Airflow Sizing Method Sum of space airflow rates
Space Airflow Sizing Method Individual peak space loads

Zone	Supply Airflow (L/s)	Zone Htg Unit (kW)	Reheat Coil (kW)	Ventilation (L/s)
1	897.7	-	-	99.0
2	437.3	-	-	63.0
3	5045.3	-	-	258.1
4	152.8	-	-	32.0
5	223.4	-	-	59.0
6	286.1	-	-	33.0
7	2115.7	-	-	344.0
8	4609.8	-	-	345.0

5. Equipment Data

VRF Outdoor Unit - Heat Pump

Performance Data - Cooling

Equipment Sizing Auto-Sized
Design OADB 35.0 °C
Estimated Maximum Load 138.7 kW
Capacity Oversizing Factor 0 %
AHRI Performance Rating 3.194 EER

Performance Data - Heating

Equipment Sizing Auto-Sized

VRF-1 Input Data

Project Name: Westgate
Prepared by: gk

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Design OADB **8.3** °C
Estimated Maximum Load **47.9** kW
Capacity Oversizing Factor **0** %
AHRI Performance Rating **3.30** COP

System Data:

Compressor Type **Variable Speed Rotary**
Refrigerant Piping Physical Length **0.0** m
Refrigerant Piping Vertical Rise **0.0** m

Heat Pump Data:

Heat Pump Cutoff OADB **-20.0** °C
Heat Recovery Used **No**
Auxiliary Heating Type **Electric Resistance**
Auxiliary Heating Upper Cutoff **21.1** °C

Dedicated Outdoor Air System (DOAS) Sizing Summary for VRF-1

Project Name: Westgate
Prepared by: gk

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Air System Information

Air System Name **VRF-1**
Equipment Class **TERM**
Air System Type **VRF**

Number of zones **8**
Floor Area **1346.7** m²
Location **Melbourne, Australia**

Sizing Calculation Information

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Zone L/s Sizing **Sum of space airflow rates**
Space L/s Sizing **Individual peak space loads**

NOTE: No other data is applicable for a Terminal Units air system without a Dedicated Outdoor Air System (DOAS).

Zone Sizing Summary for VRF-1

Project Name: Westgate
Prepared by: gk

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Air System Information

Air System Name VRF-1	Number of zones 8
Equipment Class TERM	Floor Area 1346.7 m ²
Air System Type VRF	Location Melbourne, Australia

Sizing Calculation Information

Calculation Months Jan to Dec	Zone L/s Sizing Sum of space airflow rates
Sizing Data Calculated	Space L/s Sizing Individual peak space loads

Terminal Unit Sizing Data - Cooling

Zone Name	Total Coil Load (kW)	Sens Coil Load (kW)	Coil Entering DB / WB (°C)	Coil Leaving DB / WB (°C)	Water Flow @ 5.6 K (L/s)	Time of Peak Coil Load	Zone L/(s·m ²)
Zone 1	10.5	9.7	24.3 / 18.1	15.3 / 14.7	-	Dec 1500	7.54
Zone 2	5.4	4.9	24.6 / 18.3	15.2 / 14.6	-	Dec 1500	5.99
Zone 3	53.4	50.5	23.7 / 17.9	15.3 / 14.8	-	Mar 1400	10.77
Zone 4	2.0	1.9	25.4 / 18.4	15.3 / 14.6	-	Dec 1500	9.55
Zone 5	3.1	2.9	26.1 / 18.8	15.5 / 14.8	-	Jan 1500	4.90
Zone 6	3.4	3.1	24.4 / 18.4	15.5 / 14.9	-	Jan 1400	5.01
Zone 7	24.6	24.1	25.1 / 18.4	15.7 / 15.0	-	Feb 1600	14.16
Zone 8	49.9	47.5	23.8 / 17.9	15.3 / 14.7	-	Mar 1400	11.03

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	3.3	19.1 / 22.1	-	898	0.000	0.000	99
Zone 2	2.1	18.7 / 22.6	-	437	0.000	0.000	63
Zone 3	14.0	20.2 / 22.5	-	5045	0.000	0.000	258
Zone 4	0.7	17.5 / 21.6	-	153	0.000	0.000	32
Zone 5	1.7	16.7 / 23.1	-	223	0.000	0.000	59
Zone 6	1.1	19.2 / 22.3	-	286	0.000	0.000	33
Zone 7	11.1	18.3 / 22.7	-	2116	0.000	0.000	344
Zone 8	13.9	19.9 / 22.4	-	4610	0.000	0.000	345

VRF Outdoor Unit Sizing Data

	Cooling [kW]	Heating [kW]
Peak Coincident Indoor Unit Loads	138.7	47.9
Estimated Piping / Line Losses	0.0	0.0
Total Required ODU Capacity	138.7	47.9

Note: VRF piping / line losses are based on typical loss factors for this class of equipment. Actual line loss varies widely from one product to another. Therefore, when selecting equipment it is critical to consult manufacturer's guidance to utilize actual line loss data.

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m ²)
Zone 1	8.7	Dec 1400	1.5	119.0
Zone 2	4.2	Dec 1400	0.8	73.0
Zone 3	48.9	Mar 1400	8.6	468.6

Zone Sizing Summary for VRF-1

Project Name: Westgate
Prepared by: gk

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Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m ²)
Zone 4	1.5	Dec 1400	0.1	16.0
Zone 5	2.2	Jan 1400	0.5	45.6
Zone 6	2.8	Dec 1400	0.4	57.1
Zone 7	20.5	Jan 1700	4.2	149.4
Zone 8	44.6	Apr 1400	7.0	418.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m ²)	Space L/(s·m ²)
Zone 1							
Dock office First Floor	1	8.7	Dec 1400	898	1.5	119.0	7.54
Zone 2							
Dock office Ground Floor	1	4.2	Dec 1400	437	0.8	73.0	5.99
Zone 3							
East Office	1	48.9	Mar 1400	5045	8.6	468.6	10.77
Zone 4							
Kitchen	1	1.5	Dec 1400	153	0.1	16.0	9.55
Zone 5							
Locker M/F/ First aid	1	2.2	Jan 1400	223	0.5	45.6	4.90
Zone 6							
Reception/ Print Mail	1	2.8	Dec 1400	286	0.4	57.1	5.01
Zone 7							
Staff Lunch	1	20.5	Jan 1700	2116	4.2	149.4	14.16
Zone 8							
West Office	1	44.6	Apr 1400	4610	7.0	418.0	11.03

Air System Design Load Summary for VRF-1

Project Name: Westgate
Prepared by: gk

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Feb 1400			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34.2 °C / 20.9 °C			HEATING OA DB / WB 4.5 °C / 0.9 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	225 m²	38661	-	225 m²	-	-
Wall Transmission	315 m²	1983	-	315 m²	1936	-
Roof Transmission	1347 m²	24589	-	1347 m²	9062	-
Window Transmission	225 m²	5820	-	225 m²	10098	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	1347 m²	0	-	1347 m²	0	-
Partitions	513 m²	562	-	513 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	13467 W	10805	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	27935 W	25167	-	0	0	-
People	149	7613	8952	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	11520	895	10%	2110	0
>> Total Zone Loads	-	126720	9847	-	23206	0
Zone Conditioning	-	122335	9847	-	23382	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Exhaust Fan Load	0 L/s	0	-	0 L/s	0	-
Ventilation Load	1233 L/s	16316	-2955	1233 L/s	24544	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	138651	6892	-	47926	0
Terminal Unit Cooling	-	138651	6927	-	0	0
Terminal Unit Heating	-	0	-	-	47926	-
>> Total Conditioning	-	138651	6927	-	47926	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for VRF-1

Project Name: Westgate
Prepared by: gk

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February DESIGN COOLING DAY, 1400

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34.2	0.01008	1233	400	16316	-2955
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	23.2	0.01084	13768	61	122335	9847
Return Plenum	Outlet	-17.8	0.01084	13768	61	0	-

System Psychrometrics for VRF-1

Project Name: Westgate
Prepared by: gk

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*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.202 W/(L/s-K)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2935.3 W/(L/s)
Site Altitude = 35.0 m*

TABLE 2: ZONE DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 1 (Cooling)							
Ventilation Air	-	-	-	99	-	-	-
Cooling Coil Inlet	-	24.4	0.01094	898	0	-	-
Cooling Coil Outlet	-	16.0	0.01073	898	0	9128	577
Heating Coil Inlet	-	16.0	0.01073	898	0	-	-
Heating Coil Outlet	-	16.0	0.01073	898	0	0	-
Zone Air	-	23.2	0.01106	898	0	7826	-
Zone 2 (Cooling)							
Ventilation Air	-	-	-	63	-	-	-
Cooling Coil Inlet	-	24.7	0.01089	437	0	-	-
Cooling Coil Outlet	-	15.8	0.01062	437	0	4659	356
Heating Coil Inlet	-	15.8	0.01062	437	0	-	-
Heating Coil Outlet	-	15.8	0.01062	437	0	0	-
Zone Air	-	23.1	0.01103	437	0	3822	-
Zone 3 (Cooling)							
Ventilation Air	-	-	-	258	-	-	-
Cooling Coil Inlet	-	23.8	0.01076	5045	0	-	-
Cooling Coil Outlet	-	15.7	0.01057	5045	0	49447	2908
Heating Coil Inlet	-	15.7	0.01057	5045	0	-	-
Heating Coil Outlet	-	15.7	0.01057	5045	0	0	-
Zone Air	-	23.3	0.01079	5045	0	46077	-
Zone 4 (Cooling)							
Ventilation Air	-	-	-	32	-	-	-
Cooling Coil Inlet	-	25.4	0.01037	153	0	-	-
Cooling Coil Outlet	-	15.3	0.01019	153	0	1841	84
Heating Coil Inlet	-	15.3	0.01019	153	0	-	-
Heating Coil Outlet	-	15.3	0.01019	153	0	0	-
Zone Air	-	23.0	0.01044	153	0	1413	-
Zone 5 (Cooling)							
Ventilation Air	-	-	-	59	-	-	-
Cooling Coil Inlet	-	26.0	0.01073	223	0	-	-
Cooling Coil Outlet	-	15.8	0.01046	223	0	2757	181
Heating Coil Inlet	-	15.8	0.01046	223	0	-	-
Heating Coil Outlet	-	15.8	0.01046	223	0	0	-
Zone Air	-	23.1	0.01096	223	0	1974	-
Zone 6 (Cooling)							
Ventilation Air	-	-	-	33	-	-	-
Cooling Coil Inlet	-	24.4	0.01098	286	0	-	-
Cooling Coil Outlet	-	15.8	0.01061	286	0	2956	313
Heating Coil Inlet	-	15.8	0.01061	286	0	-	-
Heating Coil Outlet	-	15.8	0.01061	286	0	0	-
Zone Air	-	23.1	0.01110	286	0	2517	-
Zone 7 (Cooling)							
Ventilation Air	-	-	-	344	-	-	-
Cooling Coil Inlet	-	25.0	0.01092	2116	0	-	-
Cooling Coil Outlet	-	16.3	0.01091	2116	0	22073	70
Heating Coil Inlet	-	16.3	0.01091	2116	0	-	-
Heating Coil Outlet	-	16.3	0.01091	2116	0	0	-
Zone Air	-	23.2	0.01108	2116	0	17530	-
Zone 8 (Cooling)							
Ventilation Air	-	-	-	345	-	-	-
Cooling Coil Inlet	-	23.9	0.01067	4610	0	-	-

System Psychrometrics for VRF-1

Project Name: Westgate
Prepared by: gk

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Cooling Coil Outlet	-	15.6	0.01049	4610	0	45789	2439
Heating Coil Inlet	-	15.6	0.01049	4610	0	-	-
Heating Coil Outlet	-	15.6	0.01049	4610	0	0	-
Zone Air	-	23.0	0.01071	4610	0	41177	-

System Psychrometrics for VRF-1

Project Name: Westgate
Prepared by: gk

02-13-2024
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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	4.5	0.00262	1233	400	-24544	0
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	21.1	0.00262	13768	0	-23382	0
Return Plenum	Outlet	-17.8	0.00262	13768	0	0	-

System Psychrometrics for VRF-1

Project Name: Westgate
Prepared by: gk

02-13-2024
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*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.202 W/(L/s-K)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2935.3 W/(L/s)
Site Altitude = 35.0 m*

TABLE 2: ZONE DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 1 (Heating)							
Ventilation Air	-	-	-	99	-	-	-
Cooling Coil Inlet	-	19.1	0.00263	898	0	-	-
Cooling Coil Outlet	-	19.1	0.00263	898	0	0	0
Heating Coil Inlet	-	19.1	0.00263	898	0	-	-
Heating Coil Outlet	-	22.1	0.00263	898	0	3278	-
Zone Air	-	20.9	0.00262	898	0	-1324	-
Zone 2 (Deadband)							
Ventilation Air	-	-	-	63	-	-	-
Cooling Coil Inlet	-	18.7	0.00263	437	0	-	-
Cooling Coil Outlet	-	18.7	0.00263	437	0	0	0
Heating Coil Inlet	-	18.7	0.00263	437	0	-	-
Heating Coil Outlet	-	22.6	0.00263	437	0	2066	-
Zone Air	-	21.1	0.00262	437	0	-809	-
Zone 3 (Heating)							
Ventilation Air	-	-	-	258	-	-	-
Cooling Coil Inlet	-	20.2	0.00263	5045	0	-	-
Cooling Coil Outlet	-	20.2	0.00263	5045	0	0	0
Heating Coil Inlet	-	20.2	0.00263	5045	0	-	-
Heating Coil Outlet	-	22.5	0.00263	5045	0	14046	-
Zone Air	-	21.0	0.00262	5045	0	-8914	-
Zone 4 (Heating)							
Ventilation Air	-	-	-	32	-	-	-
Cooling Coil Inlet	-	17.5	0.00262	153	0	-	-
Cooling Coil Outlet	-	17.5	0.00262	153	0	0	0
Heating Coil Inlet	-	17.5	0.00262	153	0	-	-
Heating Coil Outlet	-	21.6	0.00262	153	0	740	-
Zone Air	-	21.0	0.00262	153	0	-105	-
Zone 5 (Deadband)							
Ventilation Air	-	-	-	59	-	-	-
Cooling Coil Inlet	-	16.7	0.00262	223	0	-	-
Cooling Coil Outlet	-	16.7	0.00262	223	0	0	0
Heating Coil Inlet	-	16.7	0.00262	223	0	-	-
Heating Coil Outlet	-	23.1	0.00262	223	0	1724	-
Zone Air	-	21.1	0.00262	223	0	-545	-
Zone 6 (Deadband)							
Ventilation Air	-	-	-	33	-	-	-
Cooling Coil Inlet	-	19.2	0.00263	286	0	-	-
Cooling Coil Outlet	-	19.2	0.00263	286	0	0	0
Heating Coil Inlet	-	19.2	0.00263	286	0	-	-
Heating Coil Outlet	-	22.3	0.00263	286	0	1083	-
Zone Air	-	21.1	0.00262	286	0	-424	-
Zone 7 (Heating)							
Ventilation Air	-	-	-	344	-	-	-
Cooling Coil Inlet	-	18.3	0.00262	2116	0	-	-
Cooling Coil Outlet	-	18.3	0.00262	2116	0	0	0
Heating Coil Inlet	-	18.3	0.00262	2116	0	-	-
Heating Coil Outlet	-	22.7	0.00262	2116	0	11056	-
Zone Air	-	21.0	0.00262	2116	0	-4217	-
Zone 8 (Deadband)							
Ventilation Air	-	-	-	345	-	-	-
Cooling Coil Inlet	-	19.9	0.00263	4610	0	-	-

System Psychrometrics for VRF-1

Project Name: Westgate
Prepared by: gk

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Cooling Coil Outlet	-	19.9	0.00263	4610	0	0	0
Heating Coil Inlet	-	19.9	0.00263	4610	0	-	-
Heating Coil Outlet	-	22.4	0.00263	4610	0	13934	-
Zone Air	-	21.1	0.00262	4610	0	-7045	-

System Psychrometrics for VRF-1

The psychrometric graph cannot be generated for this type of system.