

Project Summary

Location and Weather	
Project	Thesis
Address	JL. Raya Medan Tenggara Medan, 20228 North Sumatera, Indonesia
Calculation Time	Tuesday, May 5, 2015 4:21 PM
Report Type	Standard
Latitude	4°
Longitude	99°
Summer Dry Bulb	34 °C
Summer Wet Bulb	26 °C
Winter Dry Bulb	21 °C
Mean Daily Range	11 °C

Building Summary

Inputs	
Building Type	Single Family
Area (m ²)	299.14
Volume (m ³)	697.45
Calculated Results	
Peak Cooling Total Load (W)	15,578
Peak Cooling Month and Hour	June 4:00 PM
Peak Cooling Sensible Load (W)	10,627
Peak Cooling Latent Load (W)	4,951
Maximum Cooling Capacity (W)	15,748
Peak Cooling Airflow (L/s)	605.6
Peak Heating Load (W)	-4,108
Peak Heating Airflow (L/s)	305.0
Checksums	
Cooling Load Density (W/m ²)	52.08
Cooling Flow Density (L/(s·m ²))	2.02
Cooling Flow / Load (L/(s·kW))	38.87
Cooling Area / Load (m ² /kW)	19.20
Heating Load Density (W/m ²)	-13.73
Heating Flow Density (L/(s·m ²))	1.02

Zone Summary - Default

Inputs	
Area (m ²)	50.33
Volume (m ³)	115.87
Cooling Setpoint	25 °C
Heating Setpoint	21 °C
Supply Air Temperature	15 °C
Number of People	11
Infiltration (L/s)	6.4
Air Volume Calculation Type	Split System(s) with Natural Ventilation
Relative Humidity	55.00% (User Specified)
Psychrometrics	
Psychrometric Message	None
Cooling Coil Entering Dry-Bulb Temperature	34 °C
Cooling Coil Entering Wet-Bulb Temperature	26 °C
Cooling Coil Leaving Dry-Bulb Temperature	13 °C
Cooling Coil Leaving Wet-Bulb Temperature	14 °C
Mixed Air Dry-Bulb Temperature	34 °C
Calculated Results	
Peak Cooling Load (W)	3,263
Peak Cooling Month and Hour	June 5:00 AM
Peak Cooling Sensible Load (W)	1,618
Peak Cooling Latent Load (W)	1,645
Peak Cooling Airflow (L/s)	81.0
Peak Heating Load (W)	-1,523
Peak Heating Airflow (L/s)	81.0
Peak Ventilation Airflow (L/s)	81.0
Checksums	
Cooling Load Density (W/m ²)	64.83
Cooling Flow Density (L/(s·m ²))	1.61
Cooling Flow / Load (L/(s·kW))	24.84
Cooling Area / Load (m ² /kW)	15.42
Heating Load Density (W/m ²)	-30.26
Heating Flow Density (L/(s·m ²))	1.61
Ventilation Density (L/(s·m ²))	1.61
Ventilation / Person (L/s)	7.4

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	5	0.15%	-2	-0.17%
Window	-2	-0.07%	0	-0.01%
Door	13	0.41%	-3	-0.21%
Roof	3	0.09%	0	-0.01%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	148	4.54%	-2	-0.14%
Ventilation	1,581	48.44%	-26	-1.81%
Lighting	146	4.48%	-146	-10.04%
Power	146	4.48%	-146	-10.04%
People	1,197	36.67%	-1,197	-82.27%
Plenum	0	0.00%		
Fan Heat	27	0.82%		
Reheat	0	0.00%		
Total	3,263	100%	-1,523	100%

Default Spaces

Space Name	Area (m ²)	Volume (m ³)	Peak Cooling Load (W)	Cooling Airflow (L/s)	Peak Heating Load (W)	Heating Airflow (L/s)
1 Bathroom 1	6.16	14.97	184	9.0	-158	9.9

3 Kitchen	31.60	70.47	1,113	54.5	-1,026	50.9
5 Bathroom 3	7.79	18.88	178	8.7	-165	12.6
10 Bathroom 2	4.78	11.55	180	8.8	-148	7.7

Zone Summary - Mechanical HVAC Zone

Inputs	
Area (m ²)	248.81
Volume (m ³)	581.58
Cooling Setpoint	25 °C
Heating Setpoint	21 °C
Supply Air Temperature	16 °C
Number of People	14
Infiltration (L/s)	22.8
Air Volume Calculation Type	Split System(s) with Natural Ventilation
Relative Humidity	55.00% (User Specified)
Psychrometrics	
Psychrometric Message	None
Cooling Coil Entering Dry-Bulb Temperature	30 °C
Cooling Coil Entering Wet-Bulb Temperature	23 °C
Cooling Coil Leaving Dry-Bulb Temperature	16 °C
Cooling Coil Leaving Wet-Bulb Temperature	17 °C
Mixed Air Dry-Bulb Temperature	30 °C
Calculated Results	
Peak Cooling Load (W)	12,485
Peak Cooling Month and Hour	June 4:00 PM
Peak Cooling Sensible Load (W)	8,941
Peak Cooling Latent Load (W)	3,544
Peak Cooling Airflow (L/s)	524.5
Peak Heating Load (W)	-2,585
Peak Heating Airflow (L/s)	223.9
Peak Ventilation Airflow (L/s)	223.9
Checksums	
Cooling Load Density (W/m ²)	50.18
Cooling Flow Density (L/(s·m ²))	2.11
Cooling Flow / Load (L/(s·kW))	42.02
Cooling Area / Load (m ² /kW)	19.93
Heating Load Density (W/m ²)	-10.39
Heating Flow Density (L/(s·m ²))	0.90
Ventilation Density (L/(s·m ²))	0.90
Ventilation / Person (L/s)	16.0

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	363	2.91%	-7	-0.31%
Window	3,303	26.46%	-15	-0.66%
Door	1,252	10.03%	-29	-1.26%
Roof	12	0.10%	0	-0.01%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	530	4.24%	-7	-0.32%
Ventilation	4,367	34.98%	-73	-3.13%
Lighting	808	6.47%	-808	-34.81%
Power	808	6.47%	-808	-34.81%
People	837	6.70%	-837	-36.06%
Plenum	0	0.00%		
Fan Heat	204	1.63%		
Reheat	0	0.00%		
Total	12,485	100%	-2,585	100%

Mechanical HVAC Zone Spaces

Space Name	Area (m ²)	Volume (m ³)	Peak Cooling Load (W)	Cooling Airflow (L/s)	Peak Heating Load (W)	Heating Airflow (L/s)
2 Bedroom 1	21.13	47.29	612	40.6	-211	19.0

4 Bedroom 4	18.53	41.41	283	18.7	-247	16.7
6 Bedroom 5	18.60	41.66	619	41.0	-254	16.7
7 Bedroom 3	14.22	31.83	458	30.4	-160	12.8
8 Hall	139.93	340.07	4,574	303.2	-1,319	125.9
9 Bedroom 2	14.13	31.62	274	18.2	-157	12.7
11 LivingRoom	22.28	47.68	1,093	72.4	-164	20.0

Space Summary - 1 Bathroom 1

Inputs	
Area (m ²)	6.16
Volume (m ³)	14.97
Wall Area (m ²)	12.23
Roof Area (m ²)	0.00
Door Area (m ²)	3.38
Partition Area (m ²)	0.00
Window Area (m ²)	0.00
Skylight Area (m ²)	0.00
Lighting Load (W)	66
Power Load (W)	66
Number of People	2
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	1.2
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	184
Peak Cooling Sensible Load (W)	111
Peak Cooling Latent Load (W)	73
Peak Cooling Airflow (L/s)	9.0
Peak Heating Load (W)	-158
Peak Heating Airflow (L/s)	9.9

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	0	0.24%	-1	-0.33%
Window	0	0.00%	0	0.00%
Door	0	0.05%	0	-0.13%
Roof	0	0.00%	0	0.00%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	27	14.90%	0	-0.25%
Lighting	18	9.69%	-18	-11.50%
Power	18	9.69%	-18	-11.50%
People	121	65.43%	-121	-77.69%
Plenum	0	0.00%		
Total	184	100%	-158	100%

Space Summary - 3 Kitchen

Inputs	
Area (m ²)	31.60
Volume (m ³)	70.47
Wall Area (m ²)	34.53
Roof Area (m ²)	0.01
Door Area (m ²)	5.55
Partition Area (m ²)	0.00
Window Area (m ²)	0.42
Skylight Area (m ²)	0.00
Lighting Load (W)	340
Power Load (W)	340
Number of People	8
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	3.3
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	1,113
Peak Cooling Sensible Load (W)	685
Peak Cooling Latent Load (W)	428
Peak Cooling Airflow (L/s)	54.5
Peak Heating Load (W)	-1,026
Peak Heating Airflow (L/s)	50.9

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	3	0.30%	-1	-0.12%
Window	-2	-0.21%	0	-0.02%
Door	14	1.22%	-3	-0.28%
Roof	0	0.00%	0	0.00%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	78	6.97%	-1	-0.11%
Lighting	92	8.24%	-92	-9.03%
Power	92	8.24%	-92	-9.03%
People	837	75.23%	-837	-82.46%
Plenum	0	0.00%		
Total	1,113	100%	-1,026	100%

Space Summary - 5 Bathroom 3

Inputs	
Area (m ²)	7.79
Volume (m ³)	18.88
Wall Area (m ²)	5.71
Roof Area (m ²)	0.36
Door Area (m ²)	1.54
Partition Area (m ²)	0.00
Window Area (m ²)	0.00
Skylight Area (m ²)	0.00
Lighting Load (W)	84
Power Load (W)	84
Number of People	1
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	0.6
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	178
Peak Cooling Sensible Load (W)	116
Peak Cooling Latent Load (W)	62
Peak Cooling Airflow (L/s)	8.7
Peak Heating Load (W)	-165
Peak Heating Airflow (L/s)	12.6

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	0	-0.19%	0	-0.14%
Window	0	0.00%	0	0.00%
Door	0	0.00%	0	0.00%
Roof	1	0.79%	0	-0.03%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	13	7.20%	0	-0.11%
Lighting	23	12.70%	-23	-13.81%
Power	23	12.70%	-23	-13.81%
People	119	66.81%	-119	-72.66%
Plenum	0	0.00%		
Total	178	100%	-165	100%

Space Summary - 10 Bathroom 2

Inputs	
Area (m ²)	4.78
Volume (m ³)	11.55
Wall Area (m ²)	13.39
Roof Area (m ²)	0.44
Door Area (m ²)	1.54
Partition Area (m ²)	0.00
Window Area (m ²)	0.00
Skylight Area (m ²)	0.00
Lighting Load (W)	51
Power Load (W)	51
Number of People	2
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	1.3
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	180
Peak Cooling Sensible Load (W)	106
Peak Cooling Latent Load (W)	74
Peak Cooling Airflow (L/s)	8.8
Peak Heating Load (W)	-148
Peak Heating Airflow (L/s)	7.7

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	2	0.86%	0	-0.33%
Window	0	0.00%	0	0.00%
Door	0	-0.12%	0	-0.04%
Roof	1	0.75%	0	-0.08%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	30	16.72%	0	-0.29%
Lighting	14	7.71%	-14	-9.49%
Power	14	7.71%	-14	-9.49%
People	119	66.38%	-119	-81.76%
Plenum	0	0.00%		
Total	180	100%	-148	100%

Space Summary - 2 Bedroom 1

Inputs	
Area (m ²)	21.13
Volume (m ³)	47.29
Wall Area (m ²)	14.14
Roof Area (m ²)	0.00
Door Area (m ²)	17.57
Partition Area (m ²)	0.00
Window Area (m ²)	0.00
Skylight Area (m ²)	0.00
Lighting Load (W)	227
Power Load (W)	227
Number of People	1
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	1.4
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	612
Peak Cooling Sensible Load (W)	561
Peak Cooling Latent Load (W)	52
Peak Cooling Airflow (L/s)	40.6
Peak Heating Load (W)	-211
Peak Heating Airflow (L/s)	19.0

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	1	0.17%	0	-0.02%
Window	0	0.00%	0	0.00%
Door	380	61.98%	-10	-5.49%
Roof	0	0.00%	0	0.00%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	32	5.19%	0	-0.23%
Lighting	68	11.17%	-68	-36.16%
Power	68	11.17%	-68	-36.16%
People	63	10.32%	-63	-33.41%
Plenum	0	0.00%		
Total	612	100%	-211	100%

Space Summary - 4 Bedroom 4

Inputs	
Area (m ²)	18.53
Volume (m ³)	41.41
Wall Area (m ²)	9.76
Roof Area (m ²)	0.34
Door Area (m ²)	1.61
Partition Area (m ²)	0.00
Window Area (m ²)	0.01
Skylight Area (m ²)	0.00
Lighting Load (W)	199
Power Load (W)	199
Number of People	2
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	0.9
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	283
Peak Cooling Sensible Load (W)	209
Peak Cooling Latent Load (W)	74
Peak Cooling Airflow (L/s)	18.7
Peak Heating Load (W)	-247
Peak Heating Airflow (L/s)	16.7

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	12	4.27%	0	-0.17%
Window	0	0.10%	0	0.00%
Door	0	0.00%	0	0.00%
Roof	2	0.80%	0	-0.02%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	22	7.76%	0	-0.12%
Lighting	60	21.30%	-60	-24.54%
Power	60	21.30%	-60	-24.54%
People	126	44.47%	-126	-51.24%
Plenum	0	0.00%		
Total	283	100%	-247	100%

Space Summary - 6 Bedroom 5

Inputs	
Area (m ²)	18.60
Volume (m ³)	41.66
Wall Area (m ²)	27.76
Roof Area (m ²)	0.22
Door Area (m ²)	1.55
Partition Area (m ²)	0.00
Window Area (m ²)	2.95
Skylight Area (m ²)	0.00
Lighting Load (W)	200
Power Load (W)	200
Number of People	3
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	2.7
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	619
Peak Cooling Sensible Load (W)	515
Peak Cooling Latent Load (W)	103
Peak Cooling Airflow (L/s)	41.0
Peak Heating Load (W)	-254
Peak Heating Airflow (L/s)	16.7

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	48	7.69%	-1	-0.44%
Window	258	41.69%	-3	-1.17%
Door	0	0.00%	0	0.00%
Roof	1	0.24%	0	-0.01%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	62	10.08%	-1	-0.36%
Lighting	60	9.75%	-60	-24.67%
Power	60	9.75%	-60	-24.67%
People	129	20.80%	-129	-52.65%
Plenum	0	0.00%		
Total	619	100%	-254	100%

Space Summary - 7 Bedroom 3

Inputs	
Area (m ²)	14.22
Volume (m ³)	31.83
Wall Area (m ²)	35.71
Roof Area (m ²)	0.28
Door Area (m ²)	3.09
Partition Area (m ²)	0.00
Window Area (m ²)	0.51
Skylight Area (m ²)	0.00
Lighting Load (W)	153
Power Load (W)	153
Number of People	2
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	3.4
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	458
Peak Cooling Sensible Load (W)	373
Peak Cooling Latent Load (W)	86
Peak Cooling Airflow (L/s)	30.4
Peak Heating Load (W)	-160
Peak Heating Airflow (L/s)	12.8

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	65	14.27%	-1	-0.80%
Window	26	5.69%	0	-0.14%
Door	129	28.10%	-2	-1.24%
Roof	2	0.41%	0	-0.03%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	80	17.51%	-1	-0.74%
Lighting	46	10.08%	-46	-30.49%
Power	46	10.08%	-46	-30.49%
People	64	13.87%	-64	-41.97%
Plenum	0	0.00%		
Total	458	100%	-160	100%

Space Summary - 8 Hall

Inputs	
Area (m ²)	139.93
Volume (m ³)	340.07
Wall Area (m ²)	107.83
Roof Area (m ²)	0.65
Door Area (m ²)	29.79
Partition Area (m ²)	0.00
Window Area (m ²)	11.36
Skylight Area (m ²)	0.00
Lighting Load (W)	1,506
Power Load (W)	1,506
Number of People	7
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	10.4
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	4,574
Peak Cooling Sensible Load (W)	4,228
Peak Cooling Latent Load (W)	346
Peak Cooling Airflow (L/s)	303.2
Peak Heating Load (W)	-1,319
Peak Heating Airflow (L/s)	125.9

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	159	3.47%	-3	-0.24%
Window	2,208	48.28%	-10	-0.83%
Door	674	14.73%	-14	-1.09%
Roof	3	0.06%	0	-0.01%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	242	5.30%	-3	-0.27%
Lighting	455	9.94%	-455	-36.15%
Power	455	9.94%	-455	-36.15%
People	379	8.29%	-379	-30.14%
Plenum	0	0.00%		
Total	4,574	100%	-1,319	100%

Space Summary - 9 Bedroom 2

Inputs	
Area (m ²)	14.13
Volume (m ³)	31.62
Wall Area (m ²)	18.41
Roof Area (m ²)	0.53
Door Area (m ²)	1.55
Partition Area (m ²)	0.00
Window Area (m ²)	0.49
Skylight Area (m ²)	0.00
Lighting Load (W)	152
Power Load (W)	152
Number of People	2
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	1.8
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	274
Peak Cooling Sensible Load (W)	216
Peak Cooling Latent Load (W)	59
Peak Cooling Airflow (L/s)	18.2
Peak Heating Load (W)	-157
Peak Heating Airflow (L/s)	12.7

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	48	17.38%	-1	-0.50%
Window	26	9.60%	0	-0.13%
Door	0	0.00%	0	0.00%
Roof	4	1.30%	0	-0.05%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	41	15.09%	-1	-0.37%
Lighting	46	16.73%	-46	-29.85%
Power	46	16.73%	-46	-29.85%
People	64	23.17%	-64	-41.35%
Plenum	0	0.00%		
Total	274	100%	-157	100%

Space Summary - 11 LivingRoom

Inputs	
Area (m ²)	22.28
Volume (m ³)	47.68
Wall Area (m ²)	22.11
Roof Area (m ²)	0.00
Door Area (m ²)	4.28
Partition Area (m ²)	0.00
Window Area (m ²)	2.57
Skylight Area (m ²)	0.00
Lighting Load (W)	240
Power Load (W)	240
Number of People	1
Sensible Heat Gain / Person (W)	73
Latent Heat Gain / Person (W)	59
Infiltration Airflow (L/s)	2.1
Space Type	Single Family (inherited from building type)
Calculated Results	
Peak Cooling Load (W)	1,093
Peak Cooling Sensible Load (W)	1,052
Peak Cooling Latent Load (W)	41
Peak Cooling Airflow (L/s)	72.4
Peak Heating Load (W)	-164
Peak Heating Airflow (L/s)	20.0

Components	Cooling		Heating	
	Loads (W)	Percentage of Total	Loads (W)	Percentage of Total
Wall	31	2.81%	-1	-0.45%
Window	784	71.78%	-2	-1.05%
Door	70	6.42%	-3	-2.18%
Roof	0	0.00%	0	0.00%
Skylight	0	0.00%	0	0.00%
Partition	0	0.00%	0	0.00%
Infiltration	50	4.55%	-1	-0.46%
Lighting	72	6.62%	-72	-47.73%
Power	72	6.62%	-72	-47.73%
People	13	1.21%	-13	-8.68%
Plenum	0	0.00%		
Total	1,093	100%	-164	100%