

Project Summary

Location and Weather	
Project	Thesis
Address	JL. Raya Medan Tenggara Medan, 20228 North Sumatera, Indonesia
Calculation Time	Tuesday, May 5, 2015 4:20 PM
Report Type	Detailed
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

Level Summary - Ground Floor

Inputs	
Area (m ²)	299.14
Volume (m ³)	697.45
Calculated Results	
Peak Cooling Total Load (W)	9,398
Peak Cooling Month and Hour	June 4:00 PM
Peak Cooling Sensible Load (W)	8,237
Peak Cooling Latent Load (W)	1,161
Peak Cooling Airflow (L/s)	605.6
Peak Heating Load (W)	-4,009
Peak Heating Airflow (L/s)	305.0
Checksums	
Cooling Load Density (W/m ²)	31.42
Cooling Flow Density (L/(s·m ²))	2.02
Cooling Flow / Load (L/(s·kW))	64.44
Cooling Area / Load (m ² /kW)	31.83
Heating Load Density (W/m ²)	-13.40
Heating Flow Density (L/(s·m ²))	1.02

Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-2	-0.14%	-	-	-	-	-	-	-	-
Ventilation	-26	-1.81%	-	-	-	-	-	-	-	-
Lighting	-146	-10.04%	-	-	-	-	-	-	-	-
Power	-146	-10.04%	-	-	-	-	-	-	-	-
People	-1,197	-82.27%	-	-	-	-	-	-	-	-
Total	-1,523	100%	-3	0	0	-1	0	0	0	0

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

Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-7	-0.32%	-	-	-	-	-	-	-	-
Ventilation	-73	-3.13%	-	-	-	-	-	-	-	-
Lighting	-808	-34.81%	-	-	-	-	-	-	-	-
Power	-808	-34.81%	-	-	-	-	-	-	-	-
People	-837	-36.06%	-	-	-	-	-	-	-	-
Total	-2,585	100%	-10	-12	-10	-17	0	-2	-1	0

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 - 3 Kitchen

Input Data	
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 Total 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

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	3	0.30%	1	0	-1	3	0	0	0	0
Window	-2	-0.21%	-2	0	0	0	0	0	0	0
Door	14	1.22%	14	0	0	0	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	78	6.97%	-	-	-	-	-	-	-	-
Lighting	92	8.24%	-	-	-	-	-	-	-	-
Power	92	8.24%	-	-	-	-	-	-	-	-
People	837	75.23%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	1,113	100%	12	0	-1	3	0	0	0	0
Heating Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	-1	-0.12%	0	0	0	-1	0	0	0	0
Window	0	-0.02%	0	0	0	0	0	0	0	0
Door	-3	-0.28%	-3	0	0	0	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-1	-0.11%	-	-	-	-	-	-	-	-
Lighting	-92	-9.03%	-	-	-	-	-	-	-	-
Power	-92	-9.03%	-	-	-	-	-	-	-	-
People	-837	-82.46%	-	-	-	-	-	-	-	-
Total	-1,026	100%	-3	0	0	-1	0	0	0	0

Space Summary - 2 Bedroom 1

Input Data	
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 Total 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

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	1	0.17%	0	0	0	1	0	0	0	0
Window	0	0.00%	0	0	0	0	0	0	0	0
Door	380	61.98%	0	122	0	257	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	32	5.19%	-	-	-	-	-	-	-	-
Lighting	68	11.17%	-	-	-	-	-	-	-	-
Power	68	11.17%	-	-	-	-	-	-	-	-
People	63	10.32%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	612	100%	0	123	0	258	0	0	0	0
Heating Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	0	-0.02%	0	0	0	0	0	0	0	0
Window	0	0.00%	0	0	0	0	0	0	0	0
Door	-10	-5.49%	0	-5	0	-5	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	0	-0.23%	-	-	-	-	-	-	-	-
Lighting	-68	-36.16%	-	-	-	-	-	-	-	-
Power	-68	-36.16%	-	-	-	-	-	-	-	-
People	-63	-33.41%	-	-	-	-	-	-	-	-
Total	-211	100%	0	-5	0	-5	0	0	0	0

Space Summary - 6 Bedroom 5

Input Data	
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 Total 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

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	48	7.69%	18	8	0	21	0	0	0	0
Window	258	41.69%	0	105	55	0	0	98	0	0
Door	0	0.00%	0	0	0	0	0	0	0	0
Roof	1	0.24%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	62	10.08%	-	-	-	-	-	-	-	-
Lighting	60	9.75%	-	-	-	-	-	-	-	-
Power	60	9.75%	-	-	-	-	-	-	-	-
People	129	20.80%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	619	100%	18	113	55	21	0	98	0	0
Heating Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	-1	-0.44%	0	0	0	0	0	0	0	0
Window	-3	-1.17%	0	-1	-1	0	0	-1	0	0
Door	0	0.00%	0	0	0	0	0	0	0	0
Roof	0	-0.01%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-1	-0.36%	-	-	-	-	-	-	-	-
Lighting	-60	-24.67%	-	-	-	-	-	-	-	-
Power	-60	-24.67%	-	-	-	-	-	-	-	-
People	-129	-52.65%	-	-	-	-	-	-	-	-
Total	-254	100%	0	-2	-1	0	0	-1	0	0

Space Summary - 7 Bedroom 3

Input Data	
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 Total 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

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	65	14.27%	23	7	21	14	0	0	0	0
Window	26	5.69%	18	0	9	0	0	0	0	0
Door	129	28.10%	70	0	0	59	0	0	0	0
Roof	2	0.41%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	80	17.51%	-	-	-	-	-	-	-	-
Lighting	46	10.08%	-	-	-	-	-	-	-	-
Power	46	10.08%	-	-	-	-	-	-	-	-
People	64	13.87%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	458	100%	110	7	30	73	0	0	0	0
Heating Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	-1	-0.80%	0	0	0	0	0	0	0	0
Window	0	-0.14%	0	0	0	0	0	0	0	0
Door	-2	-1.24%	-1	0	0	-1	0	0	0	0
Roof	0	-0.03%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-1	-0.74%	-	-	-	-	-	-	-	-
Lighting	-46	-30.49%	-	-	-	-	-	-	-	-
Power	-46	-30.49%	-	-	-	-	-	-	-	-
People	-64	-41.97%	-	-	-	-	-	-	-	-
Total	-160	100%	-1	0	0	-1	0	0	0	0

Space Summary - 8 Hall

Input Data	
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 Total 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

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	159	3.47%	47	11	71	21	7	1	0	0
Window	2,208	48.28%	1,838	0	359	0	11	0	0	0
Door	674	14.73%	6	3	148	470	2	32	7	6
Roof	3	0.06%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	242	5.30%	-	-	-	-	-	-	-	-
Lighting	455	9.94%	-	-	-	-	-	-	-	-
Power	455	9.94%	-	-	-	-	-	-	-	-
People	379	8.29%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	4,574	100%	1,891	14	579	491	20	33	7	6
Heating Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	-3	-0.24%	-1	-1	-1	0	0	0	0	0
Window	-10	-0.83%	-7	0	-4	0	0	0	0	0
Door	-14	-1.09%	0	0	-3	-9	0	-1	0	0
Roof	0	-0.01%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-3	-0.27%	-	-	-	-	-	-	-	-
Lighting	-455	-36.15%	-	-	-	-	-	-	-	-
Power	-455	-36.15%	-	-	-	-	-	-	-	-
People	-379	-30.14%	-	-	-	-	-	-	-	-
Total	-1,319	100%	-7	-1	-8	-10	0	-1	0	0

Space Summary - 11 LivingRoom

Input Data	
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 Total 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

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	31	2.81%	0	5	23	3	0	0	0	0
Window	784	71.78%	122	0	0	188	0	0	475	0
Door	70	6.42%	0	70	0	0	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	50	4.55%	-	-	-	-	-	-	-	-
Lighting	72	6.62%	-	-	-	-	-	-	-	-
Power	72	6.62%	-	-	-	-	-	-	-	-
People	13	1.21%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	1,093	100%	122	75	23	191	0	0	475	0
Heating Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	-1	-0.45%	0	0	0	0	0	0	0	0
Window	-2	-1.05%	0	0	0	0	0	0	-1	0
Door	-3	-2.18%	0	-3	0	0	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	-1	-0.46%	-	-	-	-	-	-	-	-
Lighting	-72	-47.73%	-	-	-	-	-	-	-	-
Power	-72	-47.73%	-	-	-	-	-	-	-	-
People	-13	-8.68%	-	-	-	-	-	-	-	-
Total	-164	100%	0	-4	0	0	0	0	-1	0