

***Heating And Cooling Load Calculation
HVAC Load Analysis***

for

Elite Software

CHVAC COMMERCIAL
HVAC LOADS

Prepared By:

Friday, May 8, 2020



Building Summary Loads

Building peaks in August at 5pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	421	1,592	6.47	0	345	345	0.28
Wall	928	3,510	14.26	0	980	980	0.79
Glass	0	0	0.00	0	0	0	0.00
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		5,102	20.74	0	1,325	1,325	1.06
Lighting	160	0	0.00	0	601	601	0.48
Equipment	0	0	0.00	0	0	0	0.00
Pool Latent	0	0	0.00	0	0	0	0.00
People	4	0	0.00	880	1,100	1,980	1.59
Partition	0	0	0.00	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	2,105	0	0.00	50,258	27,629	77,887	62.54
Heat. Vent.	281	18,084	73.50	0	0	0	0.00
Cool. Infil.	5	0	0.00	129	74	203	0.16
Heat. Infil.	20	1,418	5.76	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	501	501	0.40
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	42,046	42,046	33.76
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	0	0.00	0	0	0	0.00
Return Duct	0	0	0.00	0	0	0	0.00
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		24,603	100.00	51,268	73,276	124,543	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	18,084	73.50	50,258	27,629	77,887	62.54
Infiltration	1,418	5.76	129	74	203	0.16
Pretreated Air	0	0.00	0	0	0	0.00
Room Loads	5,102	20.74	880	45,072	45,952	36.90
Plenum Loads	0	0.00	0	0	0	0.00
Fan/Duct/Misc Loads	0	0.00	0	501	501	0.40
Building Totals	24,603	100.00	51,268	73,276	124,543	100.00

Check Figures

Total Building Supply Air (based on a 20° TD): 2,105 CFM
 Total Building Vent. Air (100.02% of Supply): 2,105 CFM

Total Conditioned Air Space: 421 Sq.ft
 Supply Air Per Unit Area: 4.9992 CFM/Sq.ft
 Area Per Cooling Capacity: 40.6 Sq.ft/Ton
 Cooling Capacity Per Area: 0.0247 Tons/Sq.ft
 Heating Capacity Per Area: 58.44 Btuh/Sq.ft

Total Heating Required With Outside Air: 24,603 Btuh
 Total Cooling Required With Outside Air: 10.38 Tons



Air Handler #1 - FCU1 - Summary Loads

Rm No	Description Room Peak Time Zn No., Flr No.	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	Room 1 10pm August Zn 1, Flr 5	196 2 1,568	3,144 146 0.75	1,782 1,074 5.48	501 0 0	5AC/Hr 131 135	5/ft ² 980 1,074
2	Room 2 10pm August Zn 1, Flr 0	225 2 1,800	3,375 157 0.70	1,711 1,031 4.58	510 0 0	5AC/Hr 150 145	5/ft ² 1,125 1,031
	Room Peak Totals:	421	6,519	3,493	1,012		
	Total Rooms: 2	4	304	2,105	0	281	2,105
	Unique Rooms: 2	3,368	0.72	5.00	0	281	2,105



Air Handler #1 - FCU1 - Total Load Summary

Air Handler Description: FCU1 Constant Volume - Proportion
 Supply Air Fan: Draw-Thru with program estimated horsepower of 0.20 HP
 Fan Input: 0% motor and fan efficiency with 0 in. water across the fan
 Sensible Heat Ratio: 0.98 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time: 5pm in August.
 Outdoor Conditions: Clg: 87° DB, 73° WB, 99.84 grains, Htg: 15° DB
 Indoor Conditions: Clg: 75° DB, 50% RH, Htg: 75° DB

Because of the diversity in room, plenum and ventilation loads, the room sensible peak time in August at 10pm is different from the total system peak time, hence the air system CFM was computed using a room sensible load of 3,493.

Summer: Ventilation controls outside air, ---- Winter: Ventilation controls outside air.

Room Space sensible loss:	5,102 Btuh		
Infiltration sensible loss:	1,418 Btuh	20 CFM	
Outside Air sensible loss:	18,084 Btuh	281 CFM	
Supply Duct sensible loss:	0 Btuh		
Return Duct sensible loss:	0 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			24,603 Btuh

Heating Supply Air: $6,519 / (.994 \times 1.08 \times 20) =$		304 CFM	
Winter Vent Outside Air (92.5% of supply) =		281 CFM	

Room space sensible gain:	3,025 Btuh		
Infiltration sensible gain:	74 Btuh		
Draw-thru fan sensible gain:	501 Btuh		
Supply duct sensible gain:	0 Btuh		
Reserve sensible gain:	42,046 Btuh		
Total sensible gain on supply side of coil:			45,647 Btuh

Cooling Supply Air: $46,041 / (.994 \times 1.1 \times 20) =$		2,105 CFM	
Summer Vent Outside Air (100.0% of supply) =		2,105 CFM	

Return duct sensible gain:	0 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	27,629 Btuh	2,105 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			27,629 Btuh
Total sensible gain on air handling system:			73,276 Btuh

Room space latent gain:	880 Btuh		
Infiltration latent gain:	129 Btuh		
Outside air latent gain:	50,258 Btuh		
Total latent gain on air handling system:			51,268 Btuh
Total system sensible and latent gain:			124,543 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):		2,105 CFM	
Total Air Handler Vent. Air (100.02% of Supply):		2,105 CFM	
Total Conditioned Air Space:		421 Sq.ft	
Supply Air Per Unit Area:		4.9992 CFM/Sq.ft	
Area Per Cooling Capacity:		40.6 Sq.ft/Ton	
Cooling Capacity Per Area:		0.0247 Tons/Sq.ft	
Heating Capacity Per Area:		58.44 Btuh/Sq.ft	
Total Heating Required With Outside Air:		24,603 Btuh	
Total Cooling Required With Outside Air:		10.38 Tons	



Zone Detailed Loads (At Zone Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 1-Room 1 - Air Handler 1 (FCU1), Zone 1 peaks (sensible) in August at 10pm.								
Roof-1-13-No.Clg-L	196	0.50	18.5	0.057	208		3.438	674
Wall-1-S-B-D	112	1	24.5	0.057	157		3.438	385
Wall-2-E-B-D	112	1	24.5	0.057	157		3.438	385
Wall-3-N-B-D	112	1	11.5	0.057	74		3.438	385
Wall-4-W-B-D	112	1	27.5	0.057	176		3.438	385
Lights-Prof=2	100	1.000			341			
People-Prof=2	2.0	1.000			500	400		
Cool. Infil.Direct CFM	2				6	56		
Heat. Infil.CFM/person	10						64.433	644
Sub-total					1,620	456		2,858
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					1,782	501		3,144

Room 2-Room 2 - Air Handler 1 (FCU1), Zone 1 peaks (sensible) in August at 10pm.								
Roof-1-13-No.Clg-L	225	0.50	18.5	0.057	239		3.438	774
Wall-1-S-B-D	120	1	24.5	0.057	168		3.438	413
Wall-2-E-B-D	120	1	24.5	0.057	168		3.438	413
Wall-3-N-B-D	120	1	11.5	0.057	79		3.438	413
Wall-4-W-B-D	120	1	27.5	0.057	189		3.438	413
Lights-Prof=0	60	1.000			205			
People-Prof=5	2.0	1.000			500	400		
Cool. Infil.Direct CFM	3				7	64		
Heat. Infil.CFM/person	10						64.433	644
Sub-total					1,555	464		3,068
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					1,711	510		3,375



Room Detailed Loads (At Room Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
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Room 1-Room 1 peaks (sensible) in August at 10pm, Air Handler 1 (FCU1), Zone 1, Floor Number 5, 14.0 x 14.0, Construction Type: 1 (Light)

Roof-1-13-No.Clg-L	196	0.50	18.5	0.057	208		3.438	674
Wall-1-S-B-D	112	1	24.5	0.057	157		3.438	385
Wall-2-E-B-D	112	1	24.5	0.057	157		3.438	385
Wall-3-N-B-D	112	1	11.5	0.057	74		3.438	385
Wall-4-W-B-D	112	1	27.5	0.057	176		3.438	385
Lights-Prof=2	100	1.000			341			
People-Prof=2	2.0	1.000			500	400		
Cool. Infil.Direct CFM	2				6	56		
Heat. Infil.CFM/person	10						64.433	644

Sub-total					1,620	456		2,858
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					1,782	501		3,144

Room 2-Room 2 peaks (sensible) in August at 10pm, Air Handler 1 (FCU1), Zone 1, 15.0 x 15.0, Construction Type: 1 (Light)

Roof-1-13-No.Clg-L	225	0.50	18.5	0.057	239		3.438	774
Wall-1-S-B-D	120	1	24.5	0.057	168		3.438	413
Wall-2-E-B-D	120	1	24.5	0.057	168		3.438	413
Wall-3-N-B-D	120	1	11.5	0.057	79		3.438	413
Wall-4-W-B-D	120	1	27.5	0.057	189		3.438	413
Lights-Prof=0	60	1.000			205			
People-Prof=5	2.0	1.000			500	400		
Cool. Infil.Direct CFM	3				7	64		
Heat. Infil.CFM/person	10						64.433	644

Sub-total					1,555	464		3,068
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					1,711	510		3,375