

Infonavit
HVAC Load Analysis

for

Infonavit
AV. JUAREZ MANZANA 44-A
TORREON COAHUILA

Elite Software

CHVAC COMMERCIAL
HVAC LOADS

Prepared By:

Jamm
Alta Tecnologia

martes, 20 de junio de 2017



General Project Data Input

General Project Information

Project file name: F:\ALTA-113-2\Documents\2017\ALTA\2 ANTEPROYECTO A.A. INFONAVIT TORREON 160617\ANTEPROYECTO A.A. CESI TORREON\MEMORIA DE CALCULO ENTREGA\OFICINA DELEGADO - 22.CHV

Project title: Infonavit

Project address: AV.JUAREZ MANZANA 44-A

Project city, state, ZIP: TORREON COAHUILA

Designed by: Jamm

Project date: Mayo 2017

Weather reference city: TORREON, COAHUILA, MEXICO

Client name: Infonavit

Client address: AV.JUAREZ MANZANA 44-A

Client city: TORREON COAHUILA

Company name: Alta Tecnologia

Company representative: Jamm

Barometric pressure: 29.921 in.Hg.

Altitude: 0 feet

Latitude: 25 Degrees

Mean daily temperature range: 18 Degrees

Starting & ending time for HVAC load calculations: 8am - 11pm

Number of unique zones in this project: 1

Building Default Values

Calculations performed: Both heating and cooling loads

Lighting requirements: 2.00 Watts per square foot

Equipment requirements: 2.00 Watts per square foot

People sensible load multiplier: 250 Btuh per person

People latent load multiplier: 250 Btuh per person

Zone sensible safety factor: 5 %

Zone latent safety factor: 5 %

Zone heating safety factor: 5 %

People diversity factor: 100 %

Lighting profile number: 0

Equipment profile number: 0

People profile number: 0

Building default ceiling height: 9.00 feet

Building default wall height: 9.00 feet

Internal Operating Load Profiles (C = 100)

	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr	hr
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	C	C	C	C	C	C	C	C	C	C	70	70	70	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C



General Project Data Input (cont'd)

Building-Level Design Conditions

Design Month	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Diff	In/Outdoor Correction
August	95	73	50%	75	19.11	4
Winter	25			75		

Master Roofs

Roof No.	ASHRAE Roof#	Roof U-Fac	Dark Color	Susp. Ceil
1	9	0.320	Si	Si
Roof #1 Description: Flat roof, 2" heavy weight concrete deck with no insulation, suspended ceiling below with no insulation				

Master Walls

Wall No.	ASHRAE Group	Wall U-Fac	Wall Color
1	E	0.046	D
2	G	0.062	L
3	G	0.032	L

Master Partitions

Partition No.	Partition U-Factor	Cool T-D	Heat T-D
1	0.196	25	25
Partition #1 Description: Block partition, 4" sand & gravel, hollow core, siding exterior, interior finish			
2	0.275	25	25
Partition #2 Description: Brick partition, 8" thick, face & common, interior finish			

Master Glass

Glass No.	Summer U-Factor	Winter U-Factor	Glass Shd.Coef.	Interior Shading	Interior Shd.Coef
1	1.040	1.100	0.880	2	0.640

Master Shading Devices

Shade No.	Dist Horiz Overh Projects	Dist Beyond Right W.Edge	Dist Beyond Left W.Edge	Dist Overh Above Wind	Dist Right Fin Proj	Dist R-Fin Beyond W.Edge	Ht Of Right Fin	Dist Left Fin Proj	Dist L-Fin Beyond W.Edge	Ht Of Left Fin
1	2.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00
2	2.00	1.00	1.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00



Building Summary Loads

Building peaks in August at 6pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	201	3,379	22.47	0	2,830	2,830	17.09
Wall	0	0	0.00	0	0	0	0.00
Glass	8	233	1.55	0	220	220	1.33
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		3,612	24.02	0	3,050	3,050	18.42
Lighting	50	0	0.00	0	179	179	1.08
Equipment	805	0	0.00	0	2,882	2,882	17.41
People	5	0	0.00	1,313	1,313	2,625	15.86
Partition	127	924	6.15	0	924	924	5.58
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	180	0	0.00	2,789	3,176	5,964	36.03
Heat. Vent.	180	9,744	64.81	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	403	403	2.44
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	504	3.35	0	417	417	2.52
Return Duct	0	252	1.68	0	109	109	0.66
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		15,036	100.00	4,101	12,453	16,554	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	9,744	64.81	2,789	3,176	5,964	36.03
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	4,536	30.17	1,313	8,348	9,661	58.36
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	756	5.03	0	929	929	5.61
Building Totals	15,036	100.00	4,101	12,453	16,554	100.00

Check Figures

Total Building Supply Air (based on a 22° TD): 379 CFM

Total Building Vent. Air (47.63% of Supply): 180 CFM

Total Conditioned Air Space: 402 Sq.ft

Supply Air Per Unit Area: 0.9418 CFM/Sq.ft

Area Per Cooling Capacity: 291.6 Sq.ft/Ton

Cooling Capacity Per Area: 0.0034 Tons/Sq.ft

Heating Capacity Per Area: 37.38 Btuh/Sq.ft

Total Heating Required With Outside Air: 15,036 Btuh

Total Cooling Required With Outside Air: 1.38 Tons



Air Handler #1 - Oficina Delegado - Summary Loads

Zn No	Description Zone Peak Time	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	Oficina Delegado 8pm August	402 5 3,620	4,536 233 0.58	8,348 379 0.94	1,313 0 0	20/P, 0.2/ft ² 180 180	20/P, 0.2/ft ² 180 180
Runout duct size: 6 in. dia, Diffusers: 3, CFM/runout: 126, Velocity: 643.2 ft/min, Pressure drop: 0.265 in.wg./100ft							
Zone Peak Totals:		402	4,536	8,348	1,313		
Total Zones: 1		5	233	379	0	180	180
Unique Zones: 1		3,620	0.58	0.94	0	180	180
Main trunk duct size: 9 in. h x 10in. w, Velocity: 694.6 ft/min, Pressure drop: 0.109 in.wg./100ft							



Air Handler #1 - Oficina Delegado - Total Load Summary

Air Handler Description: Oficina Delegado Constant Volume - Sum of Peaks
 Supply Air Fan: Draw-Thru with program estimated horsepower of 0.16 HP
 Fan Input: 75% motor and fan efficiency with 2 in. water across the fan
 Sensible Heat Ratio: 0.87 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time: 6pm in August.
 Outdoor Conditions: Clg: 91° DB, 72° WB, 84.75 grains, Htg: 25° DB
 Indoor Conditions: Clg: 75° DB, 50% RH, Htg: 75° DB

Because of the diversity in zone, plenum and ventilation loads, the zone sensible peak time in August at 8pm is different from the total system peak time, hence the air system CFM was computed using a zone sensible load of 8,348.

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

Zone Space sensible loss:	4,536 Btuh	
Infiltration sensible loss:	0 Btuh	0 CFM
Outside Air sensible loss:	9,744 Btuh	180 CFM
Supply Duct sensible loss:	504 Btuh	
Return Duct sensible loss:	252 Btuh	
Return Plenum sensible loss:	0 Btuh	
Total System sensible loss:		15,036 Btuh
Heating Supply Air: $5,040 / (1.000 \times 1.08 \times 20) =$		233 CFM
Winter Vent Outside Air (77.3% of supply) =		180 CFM
Zone space sensible gain:	8,348 Btuh	
Infiltration sensible gain:	0 Btuh	
Draw-thru fan sensible gain:	403 Btuh	
Supply duct sensible gain:	417 Btuh	
Reserve sensible gain:	0 Btuh	
Total sensible gain on supply side of coil:		9,168 Btuh
Cooling Supply Air: $9,168 / (1.000 \times 1.1 \times 22) =$		379 CFM
Summer Vent Outside Air (47.6% of supply) =		180 CFM
Return duct sensible gain:	109 Btuh	
Return plenum sensible gain:	0 Btuh	
Outside air sensible gain:	3,176 Btuh	180 CFM
Blow-thru fan sensible gain:	0 Btuh	
Total sensible gain on return side of coil:		3,285 Btuh
Total sensible gain on air handling system:		12,453 Btuh
Zone space latent gain:	1,313 Btuh	
Infiltration latent gain:	0 Btuh	
Outside air latent gain:	2,789 Btuh	
Total latent gain on air handling system:		4,101 Btuh
Total system sensible and latent gain:		16,554 Btuh

Check Figures

Total Air Handler Supply Air (based on a 22° TD):	379 CFM
Total Air Handler Vent. Air (47.63% of Supply):	180 CFM
Total Conditioned Air Space:	402 Sq.ft
Supply Air Per Unit Area:	0.9418 CFM/Sq.ft
Area Per Cooling Capacity:	291.6 Sq.ft/Ton
Cooling Capacity Per Area:	0.0034 Tons/Sq.ft
Heating Capacity Per Area:	37.38 Btuh/Sq.ft
Total Heating Required With Outside Air:	15,036 Btuh
Total Cooling Required With Outside Air:	1.38 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
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Zone 1-Oficina Delegado peaks (sensible) in August at 8pm, Air Handler 1 (Oficina Delegado), Group 0, 402.3 x 1.0, Construction Type: 1 (Light)

Roof-1-9-Susp.C-D	201	1.00	41.9	0.320	2,695		16.000	3,218
Partition-1-2	127		25/25	0.275	880		6.930	880
Gls-P-1-1-Tran	8.0	1.000	12	1.040	210		27.720	222
0%S-0-NS-Solar	8.0	0.880	0	0.000	0			
Lights-Prof=0	50	1.000			171			
Equipment-Prof=0	805	1.000			2,745	0		
People-Prof=1	5.0	1.000			1,250	1,250		

Sub-total					7,951	1,250		4,320
Safety factors:					+5%	+5%		+5%
Total w/ safety factors:					8,348	1,313		4,536