Institución Educativa 26 de Marzo
HVAC Load Analysis

for

Probci

Responsable:
Dir. Ingeniería.

Prepared By:

Jair Cuesta
JAG Ingeniería & Refrigeración S.A.S
Calle 87 No. 42B1 - 203
Barranquilla, Atlántico

viernes, 10 de mayo de 2024

General Project Data Input

General Project Information

Project file name:	Institución Educativa 26 de Marzo - Barrancabermeja - Primer piso - Salón múltiple, tarima y backstage.CH8
Project title:	Institución Educativa 26 de Marzo
Project city, state, ZIP:	Barrancabermeja, Santander
Designed by:	César Nucci
Project date:	miércoles, 10 de abril de 2024
Weather reference city:	BARRANCABERMEJA, COLOMBIA
Client name:	Probci
Company name:	JAG Ingeniería & Refrigeración S.A.S
Company representative:	Jair Cuesta
Company address:	Calle 87 No. 42B1 - 203
Company city:	Barranquilla, Atlántico

Barometric pressure:	29,477	in.Hg.
Altitude:	413	feet
Latitude:	7	Degrees
Mean daily temperature range:	18	Degrees
Starting & ending time for HVAC load calculations:	7am - 10pm	
Number of unique rooms in this project:	4	

Building Default Values

Calculations performed:	Cooling loads only	
Lighting requirements:	0,00	Watts per square foot
Equipment requirements:	1,50	Watts per square foot
People sensible load multiplier:	0	Btuh per person
People latent load multiplier:	0	Btuh per person
Room sensible safety factor:	10	%
Room latent safety factor:	10	%
Room heating safety factor:	10	%
People diversity factor:	100	%
Lighting profile number:	2	
Equipment profile number:	3	
People profile number:	1	
Building default ceiling height:	12,00	feet
Building default wall height:	12,00	feet

Internal Operating Load Profiles (C = 100)

	hr 1	hr 2	hr 3	hr 4	hr 5	hr 6	hr 7	hr 8	hr 9	hr 10	hr 11	hr 12	hr 13	hr 14	hr 15	hr 16	hr 17	hr 18	hr 19	hr 20	hr 21	hr 22	hr 23	hr 24
1	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	0	0
2	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	0	0
3	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	0	0
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
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
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
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
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
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
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

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
January	96	85	50%	73	107,36	7
February	96	85	50%	73	107,36	7
March	96	85	50%	73	107,36	7
April	96	85	50%	73	107,36	7
May	96	85	50%	73	107,36	7
June	96	85	50%	73	107,36	7
July	96	85	50%	73	107,36	7
August	96	85	50%	73	107,36	7
September	96	85	50%	73	107,36	7
October	96	85	50%	73	107,36	7
November	96	85	50%	73	107,36	7
December	96	85	50%	73	107,36	7
Winter	0			0		

Master Walls

Wall No.	ASHRAE Group	Wall U-Fac	Wall Color
1	E	0,290	D

Master Partitions

Partition No.	Partition U-Factor	Cool T-D	Heat T-D
1	0,290	0	0
2	0,290	5	0
3	0,290	10	0
4	0,290	15	0

Master Glass

Glass No.	Summer U-Factor	Winter U-Factor	Glass Shd.Coef.	Interior Shading	Interior Shd.Coef
1	1,144	1,100	0,950	2	0,000

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	3,25	0,00	0,00	0,00	3,25	0,00	10,00	3,25	0,00	10,00

Building Summary Loads

Building peaks in November at 1pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	0	0	0,00	0	0	0	0,00
Wall	2.588	0	0,00	0	36.259	36.259	8,78
Glass	0	0	0,00	0	0	0	0,00
Floor Slab	0	0	0,00	0	0	0	0,00
Skin Loads		0	0,00	0	36.259	36.259	8,78
Lighting	4.084	0	0,00	0	16.351	16.351	3,96
Equipment	6.742	0	0,00	0	25.306	25.306	6,13
Pool Latent	0	0	0,00	0	0	0	0,00
People	337	0	0,00	55.303	92.813	148.115	35,86
Partition	6.052	0	0,00	0	20.139	20.139	4,88
Cool. Pret.	0	0	0,00	0	0	0	0,00
Heat. Pret.	0	0	0,00	0	0	0	0,00
Cool. Vent.	0	0	0,00	0	0	0	0,00
Heat. Vent.	0	0	0,00	0	0	0	0,00
Cool. Infil.	1.685	0	0,00	122.010	42.221	164.231	39,77
Heat. Infil.	0	0	0,00	0	0	0	0,00
Draw-Thru Fan	0	0	0,00	0	2.582	2.582	0,63
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	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		0	0,00	177.312	235.670	412.983	100,00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0,00	0	0	0	0,00
Infiltration	0	0,00	122.010	42.221	164.231	39,77
Pretreated Air	0	0,00	0	0	0	0,00
Room Loads	0	0,00	55.303	190.868	246.170	59,61
Plenum Loads	0	0,00	0	0	0	0,00
Fan/Duct/Misc Loads	0	0,00	0	2.582	2.582	0,63
Building Totals	0	0,00	177.312	235.670	412.983	100,00

Check Figures

Total Building Supply Air (based on a 20° TD):	10.938	CFM
Total Building Vent. Air (0,00% of Supply):	0	CFM
Total Conditioned Air Space:	3.497	Sq.ft
Supply Air Per Unit Area:	3,1276	CFM/Sq.ft
Area Per Cooling Capacity:	101,6	Sq.ft/Ton
Cooling Capacity Per Area:	0,0098	Tons/Sq.ft
Heating Capacity Per Area:	0,00	Btuh/Sq.ft
Total Heating Required With Outside Air:	0	Btuh
Total Cooling Required With Outside Air:	34,42	Tons

Air Handler #1 - UMA Salón Múltiple - Summary Loads

Rm No	Description Room 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	Salón Múltiple	2.619	0	184.143	139.539	None	None
	3pm November	300	0	8.590	0	0	0
		62.865	0,00	3,28	0	0	0
	Room Peak Totals:	2.619	0	184.143	139.539		
	Total Rooms: 1	300	0	8.590	0	0	0
	Unique Rooms: 1	62.865	0,00	3,28	0	0	0

Air Handler #1 - UMA Salón Múltiple - Total Load Summary

Air Handler Description:	UMA Salón Múltiple Constant Volume - Sum of Peaks
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0,81 HP
Fan Input:	0% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	0,56

--- This system occurs 1 time(s) in the building. ---

Air System Peak Time:	1pm in November.
Outdoor Conditions:	Clg: 94° DB, 85° WB, 171,98 grains
Indoor Conditions:	Clg: 73° DB, 60% RH

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

Room Space sensible loss:	0	Btuh		
Infiltration sensible loss:	0	Btuh	0	CFM
Outside Air sensible loss:	0	Btuh	0	CFM
Supply Duct sensible loss:	0	Btuh		
Return Duct sensible loss:	0	Btuh		
Return Plenum sensible loss:	0	Btuh		
Total System sensible loss:				0 Btuh
Heating Supply Air: 0 / (,985 X 1,08 X 0) =			0	CFM
Winter Vent Outside Air (0,0% of supply) =			0	CFM
Room space sensible gain:	143.127	Btuh		
Infiltration sensible gain:	37.585	Btuh		
Draw-thru fan sensible gain:	2.027	Btuh		
Supply duct sensible gain:	0	Btuh		
Reserve sensible gain:	0	Btuh		
Total sensible gain on supply side of coil:				182.740 Btuh
Cooling Supply Air: 186.171 / (,985 X 1,1 X 20) =			8.590	CFM
Summer Vent Outside Air (0,0% of supply) =			0	CFM
Return duct sensible gain:	0	Btuh		
Return plenum sensible gain:	0	Btuh		
Outside air sensible gain:	0	Btuh	0	CFM
Blow-thru fan sensible gain:	0	Btuh		
Total sensible gain on return side of coil:				0 Btuh
Total sensible gain on air handling system:				182.740 Btuh
Room space latent gain:	34.650	Btuh		
Infiltration latent gain:	108.532	Btuh		
Outside air latent gain:	0	Btuh		
Total latent gain on air handling system:				143.182 Btuh
Total system sensible and latent gain:				325.922 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):	8.590	CFM
Total Air Handler Vent. Air (0,00% of Supply):	0	CFM
Total Conditioned Air Space:	2.619	Sq.ft
Supply Air Per Unit Area:	3,2793	CFM/Sq.ft
Area Per Cooling Capacity:	96,4	Sq.ft/Ton
Cooling Capacity Per Area:	0,0104	Tons/Sq.ft
Heating Capacity Per Area:	0,00	Btuh/Sq.ft
Total Heating Required With Outside Air:	0	Btuh
Total Cooling Required With Outside Air:	27,16	Tons

Air Handler #2 - UMA Tarima - Summary Loads

Rm No	Description Room 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
2	Tarima	587	0	30.455	23.728	None	None
	3pm November	25	0	1.421	0	0	0
		14.097	0,00	2,42	0	0	0
	Room Peak Totals:	587	0	30.455	23.728		
	Total Rooms: 1	25	0	1.421	0	0	0
	Unique Rooms: 1	14.097	0,00	2,42	0	0	0

Air Handler #2 - UMA Tarima - Total Load Summary

Air Handler Description:	UMA Tarima Constant Volume - Sum of Peaks
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0,13 HP
Fan Input:	0% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	0,56

--- This system occurs 1 time(s) in the building. ---

Air System Peak Time:	1pm in November.
Outdoor Conditions:	Clg: 94° DB, 85° WB, 171,98 grains
Indoor Conditions:	Clg: 73° DB, 60% RH

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

Room Space sensible loss:	0	Btuh		
Infiltration sensible loss:	0	Btuh	0	CFM
Outside Air sensible loss:	0	Btuh	0	CFM
Supply Duct sensible loss:	0	Btuh		
Return Duct sensible loss:	0	Btuh		
Return Plenum sensible loss:	0	Btuh		
Total System sensible loss:				0 Btuh
Heating Supply Air: 0 / (,985 X 1,08 X 0) =			0	CFM
Winter Vent Outside Air (0,0% of supply) =			0	CFM
Room space sensible gain:	27.052	Btuh		
Infiltration sensible gain:	3.132	Btuh		
Draw-thru fan sensible gain:	335	Btuh		
Supply duct sensible gain:	0	Btuh		
Reserve sensible gain:	0	Btuh		
Total sensible gain on supply side of coil:				30.520 Btuh
Cooling Supply Air: 30.790 / (,985 X 1,1 X 20) =			1.421	CFM
Summer Vent Outside Air (0,0% of supply) =			0	CFM
Return duct sensible gain:	0	Btuh		
Return plenum sensible gain:	0	Btuh		
Outside air sensible gain:	0	Btuh	0	CFM
Blow-thru fan sensible gain:	0	Btuh		
Total sensible gain on return side of coil:				0 Btuh
Total sensible gain on air handling system:				30.520 Btuh
Room space latent gain:	14.988	Btuh		
Infiltration latent gain:	9.044	Btuh		
Outside air latent gain:	0	Btuh		
Total latent gain on air handling system:				24.032 Btuh
Total system sensible and latent gain:				54.552 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):	1.421	CFM
Total Air Handler Vent. Air (0,00% of Supply):	0	CFM
Total Conditioned Air Space:	587	Sq.ft
Supply Air Per Unit Area:	2,4185	CFM/Sq.ft
Area Per Cooling Capacity:	129,2	Sq.ft/Ton
Cooling Capacity Per Area:	0,0077	Tons/Sq.ft
Heating Capacity Per Area:	0,00	Btuh/Sq.ft
Total Heating Required With Outside Air:	0	Btuh
Total Cooling Required With Outside Air:	4,55	Tons

Air Handler #3 - UMA Backstage - Summary Loads

Rm No	Description Room 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
3	Backstage	217	0	14.116	8.721	None	None
	3pm November	10	0	545	0	0	0
		5.220	0,00	2,51	0	0	0
	Room Peak Totals:	217	0	14.116	8.721		
	Total Rooms: 1	10	0	545	0	0	0
	Unique Rooms: 1	5.220	0,00	2,51	0	0	0

Air Handler #3 - UMA Backstage - Total Load Summary

Air Handler Description:	UMA Backstage Constant Volume - Sum of Peaks
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0,05 HP
Fan Input:	0% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	0,61

--- This system occurs 1 time(s) in the building. ---

Air System Peak Time:	1pm in November.
Outdoor Conditions:	Clg: 94° DB, 85° WB, 171,98 grains
Indoor Conditions:	Clg: 73° DB, 60% RH

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

Room Space sensible loss:	0 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	0 Btuh		
Return Duct sensible loss:	0 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			0 Btuh
Heating Supply Air: 0 / (,985 X 1,08 X 0) =		0 CFM	
Winter Vent Outside Air (0,0% of supply) =		0 CFM	
Room space sensible gain:	12.755 Btuh		
Infiltration sensible gain:	1.253 Btuh		
Draw-thru fan sensible gain:	129 Btuh		
Supply duct sensible gain:	0 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			14.136 Btuh
Cooling Supply Air: 14.245 / (,985 X 1,1 X 24) =		545 CFM	
Summer Vent Outside Air (0,0% of supply) =		0 CFM	
Return duct sensible gain:	0 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			0 Btuh
Total sensible gain on air handling system:			14.136 Btuh
Room space latent gain:	5.225 Btuh		
Infiltration latent gain:	3.618 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			8.843 Btuh
Total system sensible and latent gain:			22.979 Btuh

Check Figures

Total Air Handler Supply Air (based on a 24° TD):	545	CFM
Total Air Handler Vent. Air (0,00% of Supply):	0	CFM
Total Conditioned Air Space:	217	Sq.ft
Supply Air Per Unit Area:	2,5070	CFM/Sq.ft
Area Per Cooling Capacity:	113,6	Sq.ft/Ton
Cooling Capacity Per Area:	0,0088	Tons/Sq.ft
Heating Capacity Per Area:	0,00	Btuh/Sq.ft
Total Heating Required With Outside Air:	0	Btuh
Total Cooling Required With Outside Air:	1,91	Tons

Air Handler #4 - Cuarto de Sonido - Summary Loads

Rm No	Description Room 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
4	Cuarto de Sonido	73	0	8.207	1.231	None	None
	3pm December	2	0	383	0	0	0
		878	0,00	5,24	0	0	0
	Room Peak Totals:	73	0	8.207	1.231		
	Total Rooms: 1	2	0	383	0	0	0
	Unique Rooms: 1	878	0,00	5,24	0	0	0

Air Handler #4 - Cuarto de Sonido - Total Load Summary

Air Handler Description:	Cuarto de Sonido Constant Volume - Sum of Peaks
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0,04 HP
Fan Input:	0% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	0,87

--- This system occurs 1 time(s) in the building. ---

Air System Peak Time:	1pm in December.
Outdoor Conditions:	Clg: 94° DB, 85° WB, 171,98 grains
Indoor Conditions:	Clg: 73° DB, 50% RH (avg.)

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

Room Space sensible loss:	0	Btuh		
Infiltration sensible loss:	0	Btuh	0	CFM
Outside Air sensible loss:	0	Btuh	0	CFM
Supply Duct sensible loss:	0	Btuh		
Return Duct sensible loss:	0	Btuh		
Return Plenum sensible loss:	0	Btuh		
Total System sensible loss:				0 Btuh
Heating Supply Air: 0 / (,985 X 1,08 X 0) =			0	CFM
Winter Vent Outside Air (0,0% of supply) =			0	CFM
Room space sensible gain:	7.933	Btuh		
Infiltration sensible gain:	251	Btuh		
Draw-thru fan sensible gain:	90	Btuh		
Supply duct sensible gain:	0	Btuh		
Reserve sensible gain:	0	Btuh		
Total sensible gain on supply side of coil:				8.274 Btuh
Cooling Supply Air: 8.298 / (,985 X 1,1 X 20) =			383	CFM
Summer Vent Outside Air (0,0% of supply) =			0	CFM
Return duct sensible gain:	0	Btuh		
Return plenum sensible gain:	0	Btuh		
Outside air sensible gain:	0	Btuh	0	CFM
Blow-thru fan sensible gain:	0	Btuh		
Total sensible gain on return side of coil:				0 Btuh
Total sensible gain on air handling system:				8.274 Btuh
Room space latent gain:	440	Btuh		
Infiltration latent gain:	815	Btuh		
Outside air latent gain:	0	Btuh		
Total latent gain on air handling system:				1.255 Btuh
Total system sensible and latent gain:				9.530 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):	383	CFM
Total Air Handler Vent. Air (0,00% of Supply):	0	CFM
Total Conditioned Air Space:	73	Sq.ft
Supply Air Per Unit Area:	5,2344	CFM/Sq.ft
Area Per Cooling Capacity:	92,1	Sq.ft/Ton
Cooling Capacity Per Area:	0,0109	Tons/Sq.ft
Heating Capacity Per Area:	0,00	Btuh/Sq.ft
Total Heating Required With Outside Air:	0	Btuh
Total Cooling Required With Outside Air:	0,79	Tons

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
Room 1-Salón Múltiple peaks (sensible) in November at 3pm, Air Handler 1 (UMA Salón Múltiple), Zone 0, 82,5 x 31,8, Construction Type: 10 (Medium)								
Wall-4-111-E-D	1.980	1	43,7	0,290	25.115		0,000	0
Partition-1-3	1347,6		10/0	0,290	3.908		0,000	0
Partition door-2-3	324		10/0	0,290	940		0,000	0
Partition door-3-3	308,4		10/0	0,290	894		0,000	0
Partition-5-4	762		15/0	0,290	3.315		0,000	0
Lights-Prof=2	2.619	1,000			8.938			
Equipment-Prof=3	3.929	1,000			13.407	0		
People-Prof=1	300,0	1,000			73.500	31.500		
Cool. Infil.CFM/person	1.500				37.387	95.353		
Heat. Infil.AC/hr	0						0,000	0
Sub-total					167.403	126.853		0
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					184.143	139.539		0

Lighting Cooling Loads

Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
Audience/seating Area	1	watts/sq.ft.	1	1	1	1	8.938
Total							8.938

Room 2-Tarima peaks (sensible) in November at 3pm, Air Handler 2 (UMA Tarima), Zone 0, 18,5 x 31,8, Construction Type: 10 (Medium)								
Wall-3-111-E-D	444	1	43,7	0,290	5.632		0,000	0
Partition-1-3	444		10/0	0,290	1.288		0,000	0
Partition-2-3	762		10/0	0,290	2.210		0,000	0
Lights-Prof=2	1.175	1,000			4.810			
Equipment-Prof=3	881	1,000			3.006	0		
People-Prof=1	25,0	1,000			7.625	13.625		
Cool. Infil.CFM/person	125				3.116	7.946		
Heat. Infil.AC/hr	0						0,000	0
Sub-total					27.686	21.571		0
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					30.455	23.728		0

Lighting Cooling Loads

Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
Pulpit	2,4	watts/sq.ft.	1	1	1	1	4.810
Miscellaneous Lighting	-234,7001	watts	1	0	1	1	0
Total							4.810

Room Detailed Loads (At Room Peak Times) (cont'd)

Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
Room 3-Backstage peaks (sensible) in November at 3pm, Air Handler 3 (UMA Backstage), Zone 0, 6,9 x 31,8, Construction Type: 10 (Medium)							
Wall-4-111-E-D	94	1	43,7	0,290	1.187	0,000	0
Door-5-111-E-D	71	1	43,7	0,290	898	0,000	0
Partition-1-3	93,59999		10/0	0,290	271	0,000	0
Partition door-2-3	70,8		10/0	0,290	205	0,000	0
Partition-3-3	762		10/0	0,290	2.210	0,000	0
Partition-6-3	762		10/0	0,290	2.210	0,000	0
Lights-Prof=2	217	1,000			742		
Equipment-Prof=3	326	1,000			1.113	0	
People-Prof=1	10,0	1,000			2.750	4.750	
Cool. Infil.CFM/person	50				1.246	3.178	
Heat. Infil.AC/hr	0					0,000	0
Sub-total					12.833	7.928	0
Safety factors:					+10%	+10%	+10%
Total w/ safety factors:					14.116	8.721	0

Lighting Cooling Loads

Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
Dressing/locker/fitting room	1	watts/sq.ft.	1	1	1	1	742
Total							742

Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
Room 4-Cuarto de Sonido peaks (sensible) in December at 3pm, Air Handler 4 (Cuarto de Sonido), Zone 0, 7,4 x 10,0, Construction Type: 22 (Medium), SIDB: 73°F							
Partition-1-3	52,8		10/0	0,290	153	0,000	0
Partition door-2-3	35,4		10/0	0,290	103	0,000	0
Partition-3-2	119,4		5/0	0,290	173	0,000	0
Partition-4-3	88,2		10/0	0,290	256	0,000	0
Partition-5-2	119,4		5/0	0,290	173	0,000	0
Lights-Prof=2	73	1,000			374		
Equipment-Prof=3	1.606	1,000			5.480	0	
People-Prof=1	2,0	1,000			500	400	
Cool. Infil.CFM/person	10				249	719	
Heat. Infil.AC/hr	0					0,000	0
Sub-total					7.461	1.119	0
Safety factors:					+10%	+10%	+10%
Total w/ safety factors:					8.207	1.231	0

Equipment Cooling Loads

Item Name	Nominal Output Sensible	Quantity Type Sensible	Nominal Output Latent	Quantity Type Latent	Sensible Load (Btuh)	Latent Load (Btuh)
Desktop computer, Manufacturer B (model A) 3.0 GHz processor, 2 GB RAM	77	watts	0	watts	263	0

Room Detailed Loads (At Room Peak Times) (cont'd)

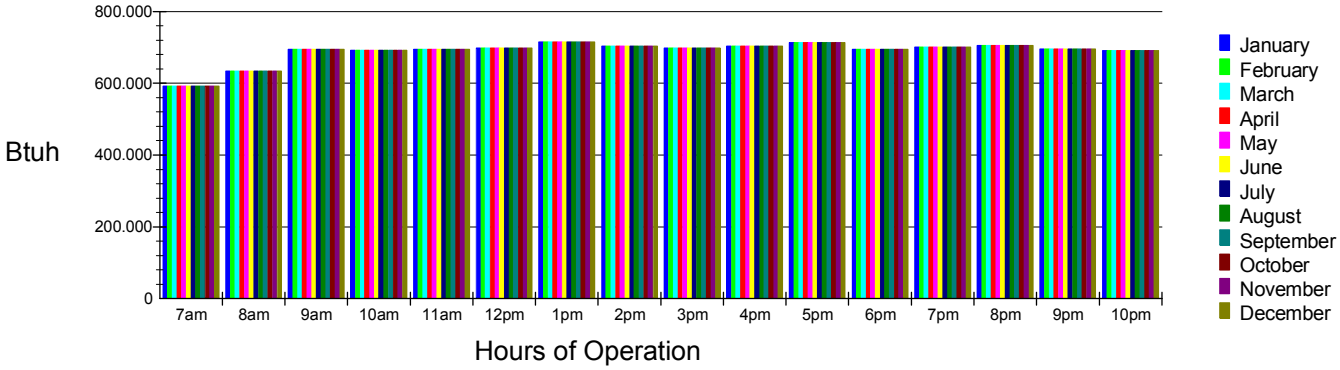
Item Name	Nominal Output Sensible	Quantity Type Sensible	Nominal Output Latent	Quantity Type Latent	Sensible Load (Btuh)	Latent Load (Btuh)
Flat-panel monitor, Manufacturer Y (model A), 19 in. screen	28	watts	0	watts	96	0
Sistema de sonido	1.501	watts	0	watts	5.122	0
Total					5.480	0

Lighting Cooling Loads

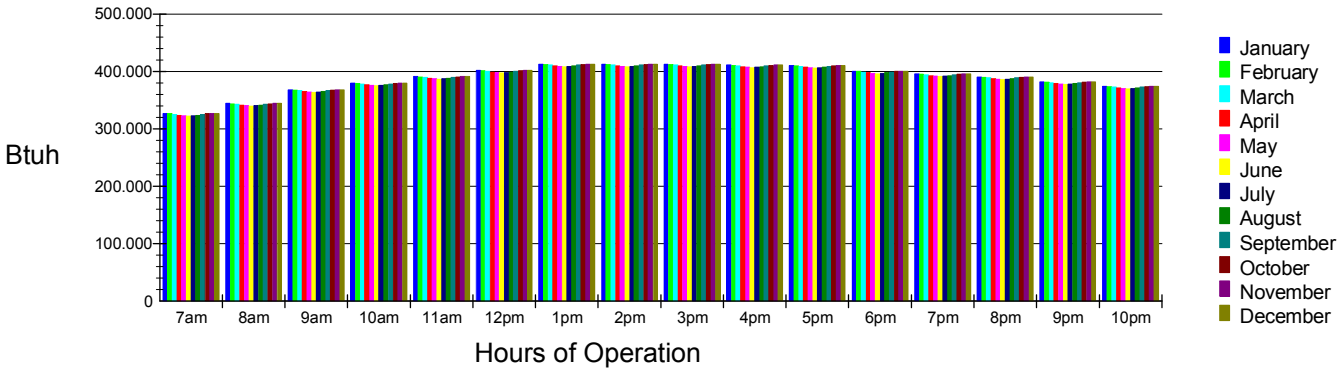
Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
Electrical/mechanical	1,5	watts/sq.ft.	1	1	1	1	374
Miscellaneous Lighting	-36,69875	watts	1	0	1	1	0
Total							374

Building Profile Graphs

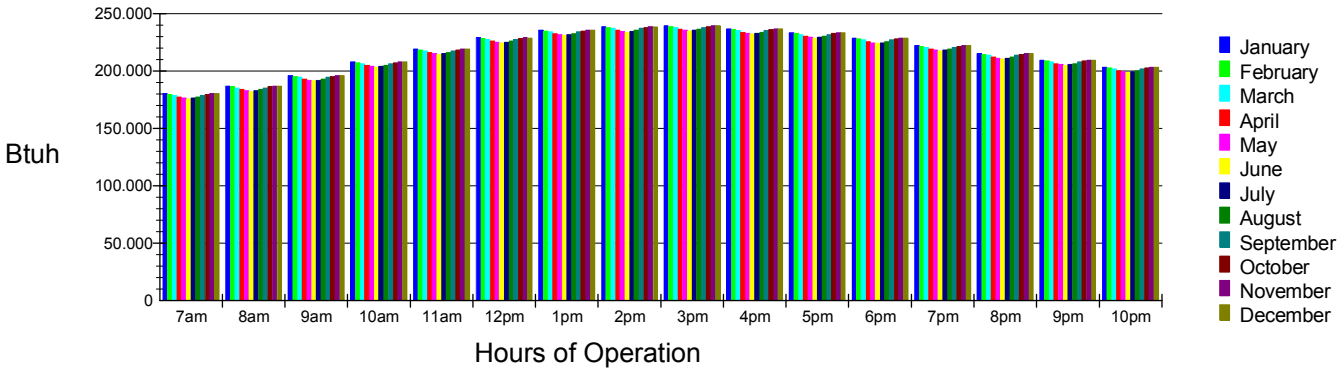
Building Adjusted Load



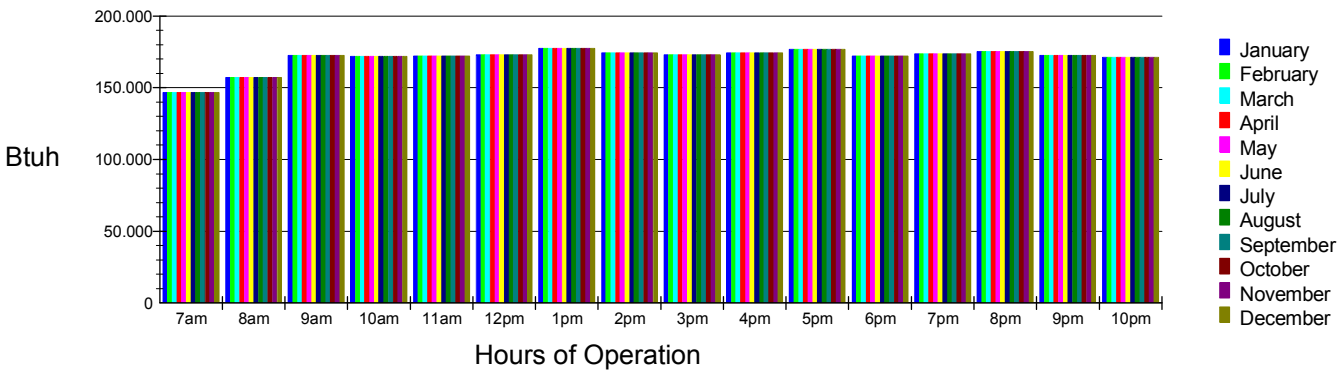
Building Net Load



Building Sensible Load



Building Latent Load



Air System #1 (UMA Salón Múltiple) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition		48,637		53,000	
Draw-Thru Fan			2.027	0,218	93
Misc Load on Supply Side	0	0,000	0	0,000	0
Supply Air Duct			0	0,000	0
Room Loads	143.182	24,883	184.143	19,782	8.496
Sensible Reserve			0	0,000	0
Room Condition	143.182	73,519	186.171	73,000	8.590
Return Air Duct			0	0,000	
Return Air Plenum			0	0,000	
Misc Load on Return Side	0	0,000	0	0,000	
Vent Air 0 CFM	0	0,000	0	0,000	
Blow-Thru Fan			0	0,000	
Entering Coil Condition	143.182	73,519	186.171	73,000	8.590

General Psychrometric Equations Used In Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29,921)
TSH = PR x 1,10 x CFM x (DB entering - DB leaving)
TLH = PR x 0,68 x CFM x (Grains entering - Grains leaving)
GTH = PR x 4,50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0,985	x	1,10	x	8.590	x (	73,0	-	53,0	) =	186.170 Btuh
TLH	=	0,985	x	0,68	x	8.590	x (	73,5	-	48,6	) =	143.182 Btuh
SUM	=											329.352 Btuh
GTH	=	0,985	x	4,50	x	8.590	x (	29,0	-	20,3	) =	333.167 Btuh
Total System Load											=	325.922 Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM	=	333.167 / (	10,00 x	500	)	=	66,6 GPM
Heating GPM	=	0 / (	0,00 x	500	)	=	0,0 GPM
Steam Req.	=	0 /	970			=	0,0 lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature:	73,00
Wet bulb temperature:	63,47
Relative humidity:	59,80
Enthalpy:	29,01 Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature:	,00

Leaving Cooling Coil Conditions

Dry bulb temperature:	53,00
Wet bulb temperature:	49,78
Relative humidity:	80,37
Enthalpy:	20,26 Btu/lbm

Leaving Heating Coil Conditions

Dry bulb temperature:	,00

Air System #2 (UMA Tarima) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition		48,265		53,000	
Draw-Thru Fan			335	0,218	15
Misc Load on Supply Side	0	0,000	0	0,000	0
Supply Air Duct			0	0,000	0
Room Loads	24.032	25,252	30.455	19,783	1.405
Sensible Reserve			0	0,000	0
Room Condition	24.032	73,517	30.790	73,000	1.421
Return Air Duct			0	0,000	
Return Air Plenum			0	0,000	
Misc Load on Return Side	0	0,000	0	0,000	
Vent Air 0 CFM	0	0,000	0	0,000	
Blow-Thru Fan			0	0,000	
Entering Coil Condition	24.032	73,517	30.790	73,000	1.421

General Psychrometric Equations Used In Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29,921)
TSH = PR x 1,10 x CFM x (DB entering - DB leaving)
TLH = PR x 0,68 x CFM x (Grains entering - Grains leaving)
GTH = PR x 4,50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0,985	x	1,10	x	1.421	x (	73,0	-	53,0	) =	30.789 Btuh
TLH	=	0,985	x	0,68	x	1.421	x (	73,5	-	48,3	) =	24.032 Btuh
SUM	=											54.821 Btuh
GTH	=	0,985	x	4,50	x	1.421	x (	29,0	-	20,2	) =	55.461 Btuh
Total System Load											=	54.552 Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM =	55.461	/ (	10,00	x	500	) =	11,1 GPM
Heating GPM =	0	/ (	0,00	x	500	) =	0,0 GPM
Steam Req. =	0	/	970			=	0,0 lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature:	73,00	
Wet bulb temperature:	63,47	
Relative humidity:	59,78	
Enthalpy:	29,01	Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature:	,00

Leaving Cooling Coil Conditions

Dry bulb temperature:	53,00	
Wet bulb temperature:	49,67	
Relative humidity:	79,76	
Enthalpy:	20,20	Btu/lbm

Leaving Heating Coil Conditions

Dry bulb temperature:	,00

Air System #3 (UMA Backstage) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition		49,371		48,894	
Draw-Thru Fan			129	0,218	5
Misc Load on Supply Side	0	0,000	0	0,000	0
Supply Air Duct			0	0,000	0
Room Loads	8.843	24,209	14.116	23,891	540
Sensible Reserve			0	0,000	0
Room Condition	8.843	73,580	14.245	73,000	545
Return Air Duct			0	0,000	
Return Air Plenum			0	0,000	
Misc Load on Return Side	0	0,000	0	0,000	
Vent Air 0 CFM	0	0,000	0	0,000	
Blow-Thru Fan			0	0,000	
Entering Coil Condition	8.843	73,580	14.245	73,000	545

General Psychrometric Equations Used In Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29,921)
TSH = PR x 1,10 x CFM x (DB entering - DB leaving)
TLH = PR x 0,68 x CFM x (Grains entering - Grains leaving)
GTH = PR x 4,50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0,985	x	1,10	x	545	x (	73,0	-	48,9	) =	14.244 Btuh
TLH	=	0,985	x	0,68	x	545	x (	73,6	-	49,4	) =	8.843 Btuh
SUM	=											23.087 Btuh
GTH	=	0,985	x	4,50	x	545	x (	29,0	-	19,4	) =	23.310 Btuh
Total System Load											=	22.979 Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM =	23.310	/ (	10,00	x	500	) =	4,7 GPM
Heating GPM =	0	/ (	0,00	x	500	) =	0,0 GPM
Steam Req. =	0	/	970			=	0,0 lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature:	73,00	
Wet bulb temperature:	63,49	
Relative humidity:	59,84	
Enthalpy:	29,02	Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature:	,00

Leaving Cooling Coil Conditions

Dry bulb temperature:	48,89	
Wet bulb temperature:	48,15	
Relative humidity:	95,00	
Enthalpy:	19,37	Btu/lbm

Leaving Heating Coil Conditions

Dry bulb temperature:	,00

Air System #4 (Cuarto de Sonido) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition		56,362		53,000	
Draw-Thru Fan			90	0,218	4
Misc Load on Supply Side	0	0,000	0	0,000	0
Supply Air Duct			0	0,000	0
Room Loads	1.255	4,896	8.207	19,785	379
Sensible Reserve			0	0,000	0
Room Condition	1.255	61,257	8.298	73,000	383
Return Air Duct			0	0,000	
Return Air Plenum			0	0,000	
Misc Load on Return Side	0	0,000	0	0,000	
Vent Air 0 CFM	0	0,000	0	0,000	
Blow-Thru Fan			0	0,000	
Entering Coil Condition	1.255	61,257	8.298	73,000	383

General Psychrometric Equations Used In Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29,921)
TSH = PR x 1,10 x CFM x (DB entering - DB leaving)
TLH = PR x 0,68 x CFM x (Grains entering - Grains leaving)
GTH = PR x 4,50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0,985	x	1,10	x	383	x (	73,0	-	53,0	) =	8.297 Btuh
TLH	=	0,985	x	0,68	x	383	x (	61,3	-	56,4	) =	1.255 Btuh
SUM	=											9.552 Btuh
GTH	=	0,985	x	4,50	x	383	x (	27,1	-	21,5	) =	9.565 Btuh
Total System Load											=	9.530 Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

Cooling GPM =	9.565	/ (	10,00	x	500	)	= 1,9 GPM
Heating GPM =	0	/ (	0,00	x	500	)	= 0,0 GPM
Steam Req. =	0	/	970				= 0,0 lb./hr

Entering Cooling Coil Conditions

Dry bulb temperature:	73,00	
Wet bulb temperature:	60,83	
Relative humidity:	49,96	
Enthalpy:	27,09	Btu/lbm

Entering Heating Coil Conditions

Dry bulb temperature:	,00

Leaving Cooling Coil Conditions

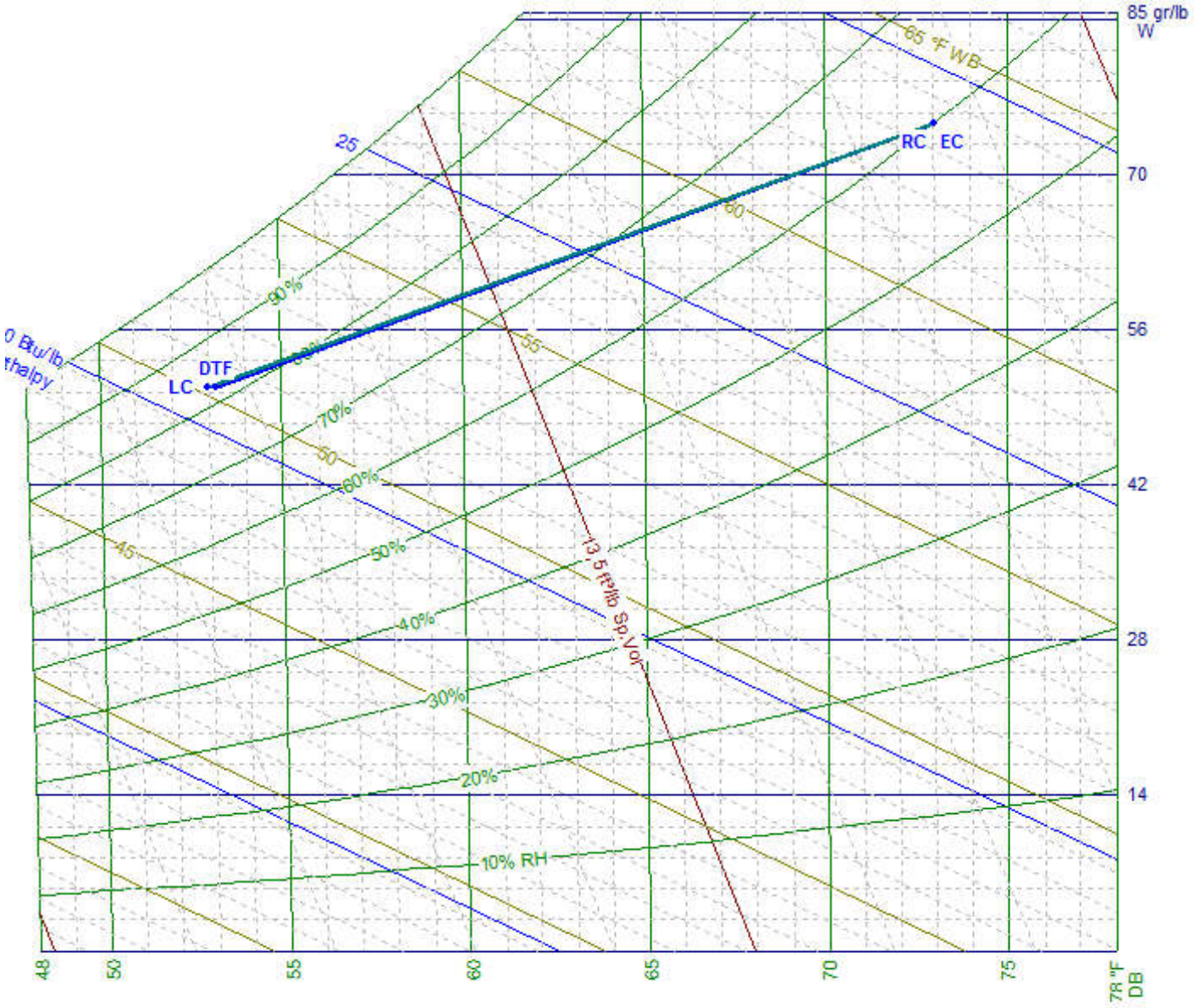
Dry bulb temperature:	53,00	
Wet bulb temperature:	51,87	
Relative humidity:	93,01	
Enthalpy:	21,45	Btu/lbm

Leaving Heating Coil Conditions

Dry bulb temperature:	,00

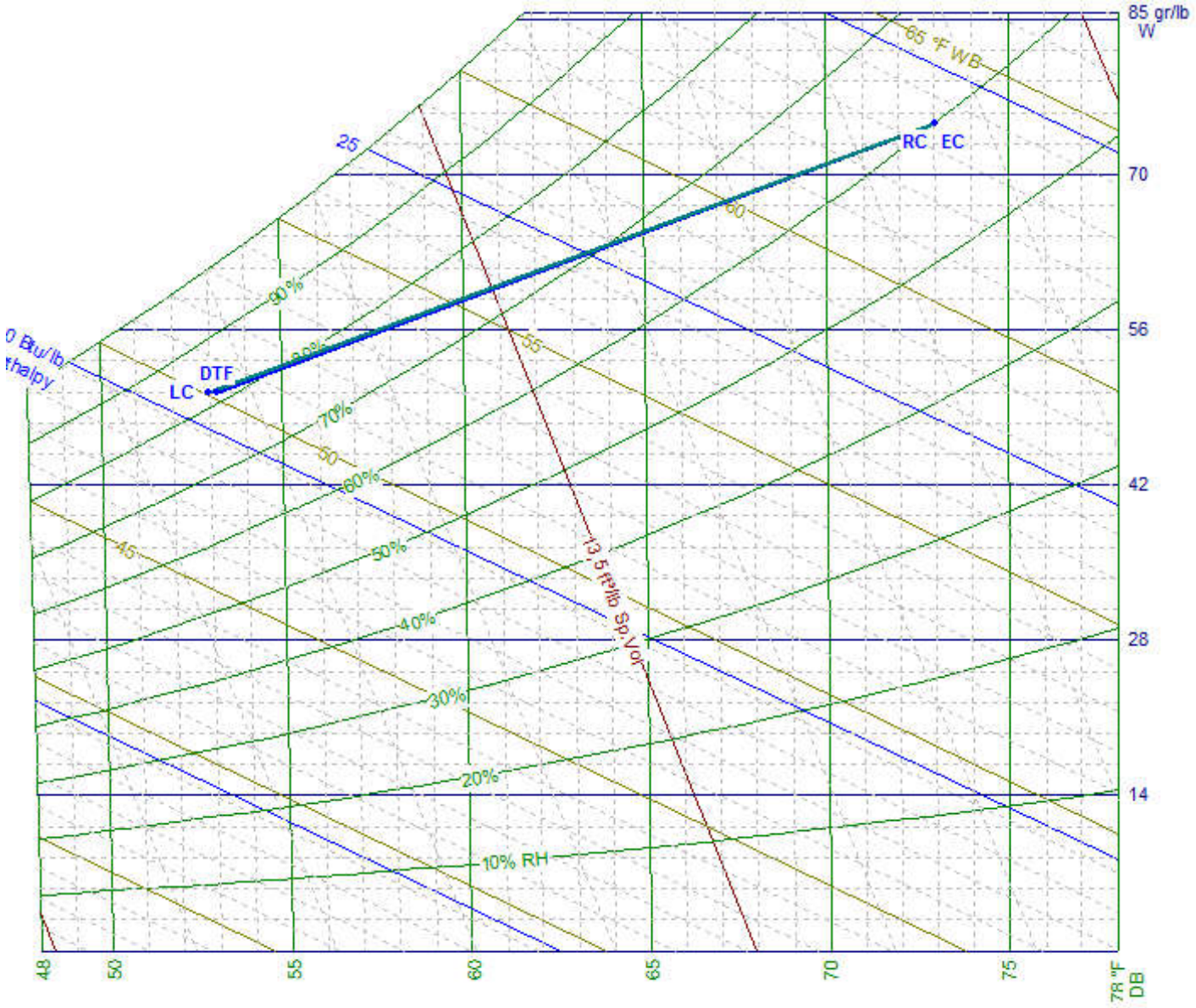
Air System #1 (UMA Salón Múltiple) Psychrometric Chart

RC	Room Condition	OC	Outdoor Condition
LC	Leaving Coil Condition	EC	Entering Coil Condition
SD	Supply Duct Temperature Rise	RD	Return Duct Temperature Rise
DTF	Draw Through Fan Sensible Gain	BTF	Blow Through Fan Sensible Gain
RE	Reserve or Reheat Sensible Gain	PL	Return Air Plenum Sensible Gain
SM	Supply Side Miscellaneous Sensible Gain	MR	Return Side Miscellaneous Gain
PRE	Pretreated Air Condition	HRV	Heat Recovery Ventilator Condition
MIX	Mixed Air Condition	RML	Return Miscellaneous Latent Gain



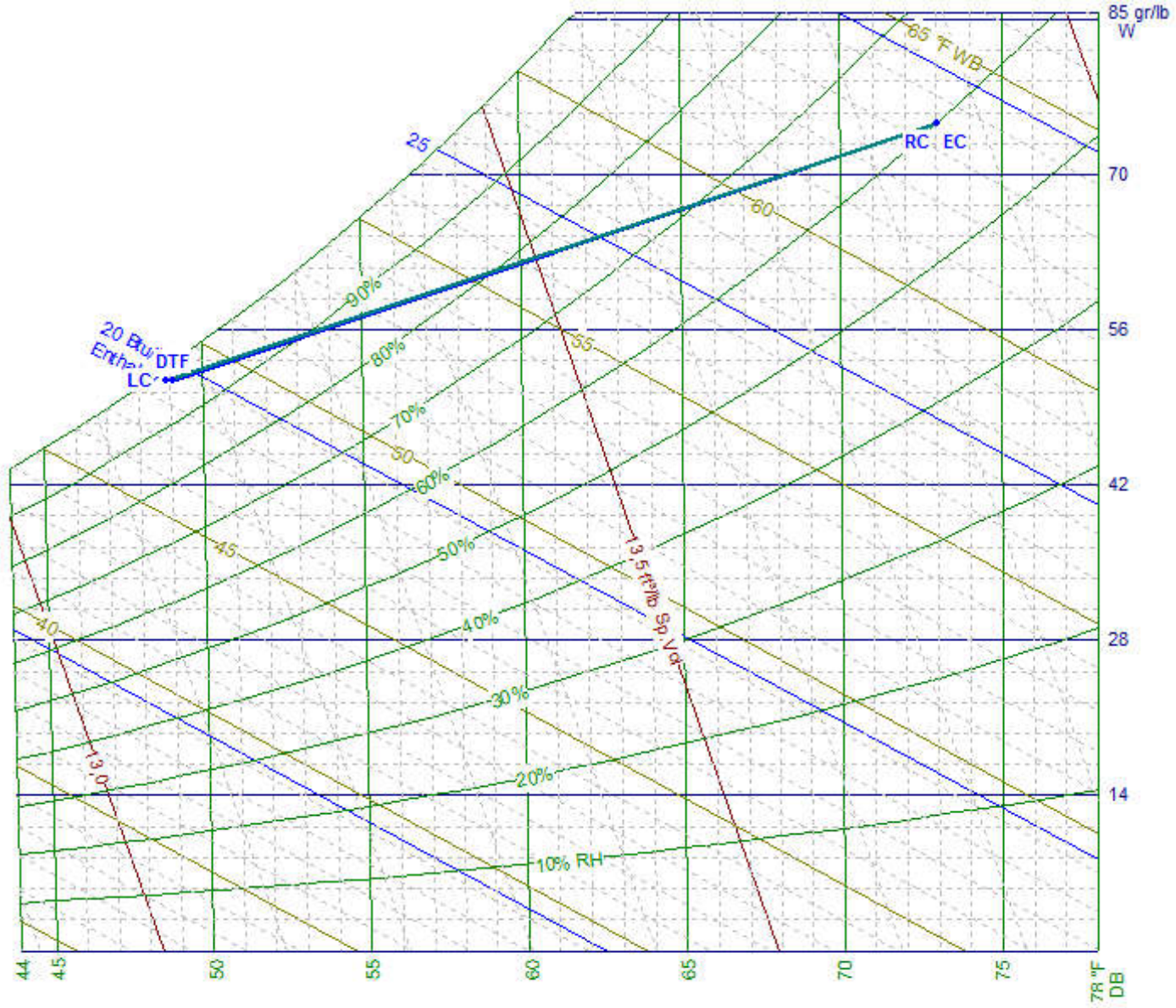
Air System #2 (UMA Tarima) Psychrometric Chart

RC	Room Condition	OC	Outdoor Condition
LC	Leaving Coil Condition	EC	Entering Coil Condition
SD	Supply Duct Temperature Rise	RD	Return Duct Temperature Rise
DTF	Draw Through Fan Sensible Gain	BTF	Blow Through Fan Sensible Gain
RE	Reserve or Reheat Sensible Gain	PL	Return Air Plenum Sensible Gain
SM	Supply Side Miscellaneous Sensible Gain	MR	Return Side Miscellaneous Gain
PRE	Pretreated Air Condition	HRV	Heat Recovery Ventilator Condition
MIX	Mixed Air Condition	RML	Return Miscellaneous Latent Gain



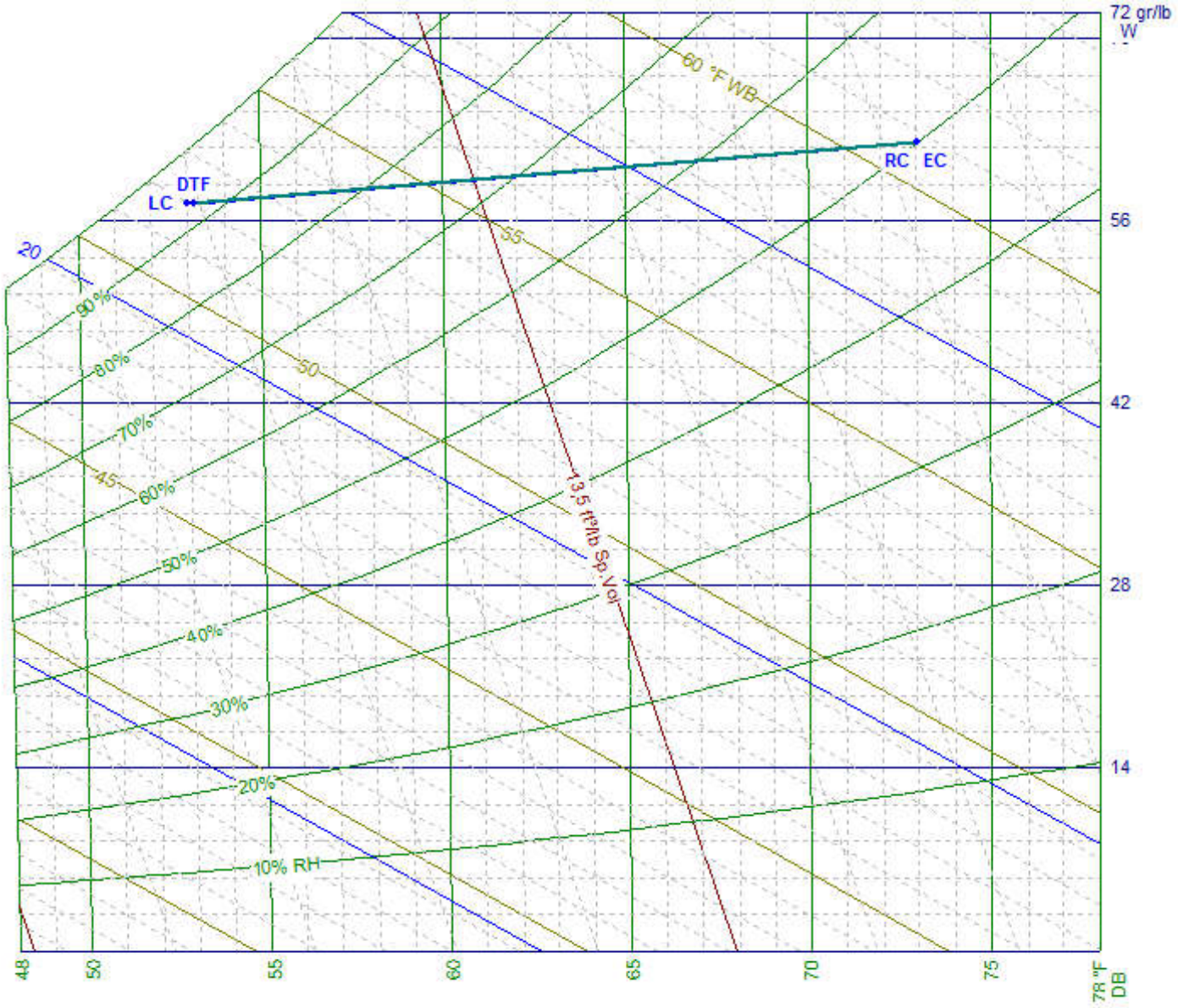
Air System #3 (UMA Backstage) Psychrometric Chart

RC	Room Condition	OC	Outdoor Condition
LC	Leaving Coil Condition	EC	Entering Coil Condition
SD	Supply Duct Temperature Rise	RD	Return Duct Temperature Rise
DTF	Draw Through Fan Sensible Gain	BTF	Blow Through Fan Sensible Gain
RE	Reserve or Reheat Sensible Gain	PL	Return Air Plenum Sensible Gain
SM	Supply Side Miscellaneous Sensible Gain	MR	Return Side Miscellaneous Gain
PRE	Pretreated Air Condition	HRV	Heat Recovery Ventilator Condition
MIX	Mixed Air Condition	RML	Return Miscellaneous Latent Gain



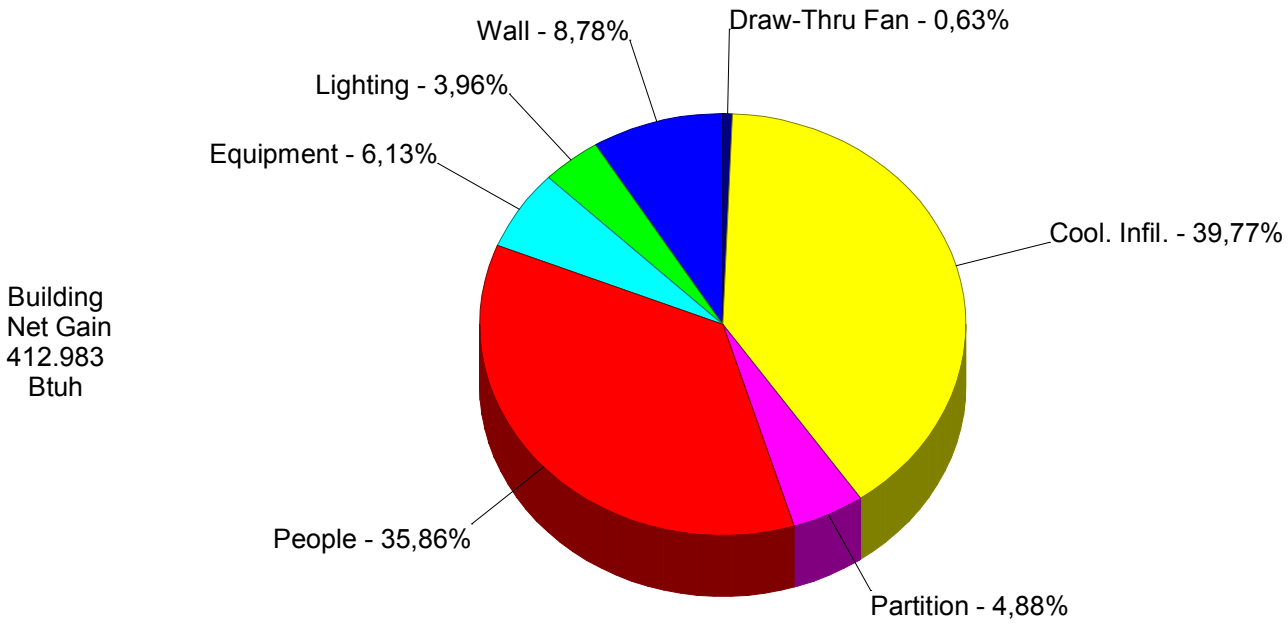
Air System #4 (Cuarto de Sonido) Psychrometric Chart

RC	Room Condition	OC	Outdoor Condition
LC	Leaving Coil Condition	EC	Entering Coil Condition
SD	Supply Duct Temperature Rise	RD	Return Duct Temperature Rise
DTF	Draw Through Fan Sensible Gain	BTF	Blow Through Fan Sensible Gain
RE	Reserve or Reheat Sensible Gain	PL	Return Air Plenum Sensible Gain
SM	Supply Side Miscellaneous Sensible Gain	MR	Return Side Miscellaneous Gain
PRE	Pretreated Air Condition	HRV	Heat Recovery Ventilator Condition
MIX	Mixed Air Condition	RML	Return Miscellaneous Latent Gain



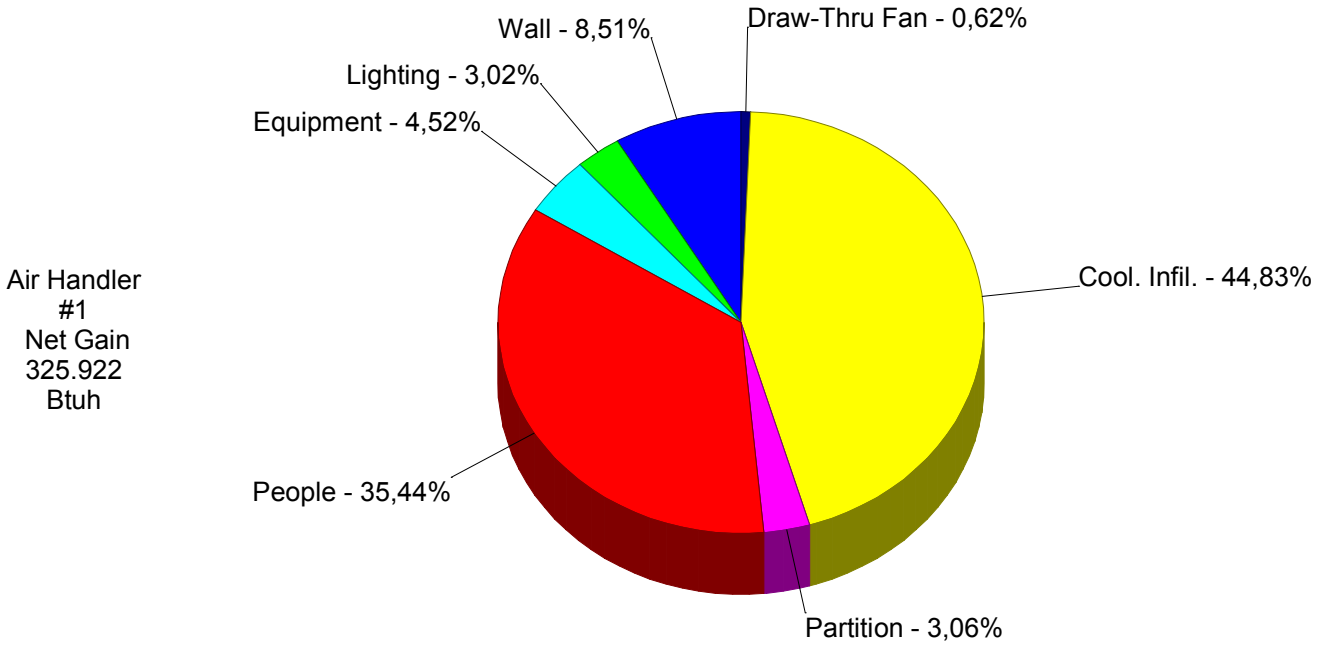
Building Pie Charts

Building peaks in November at 1pm.



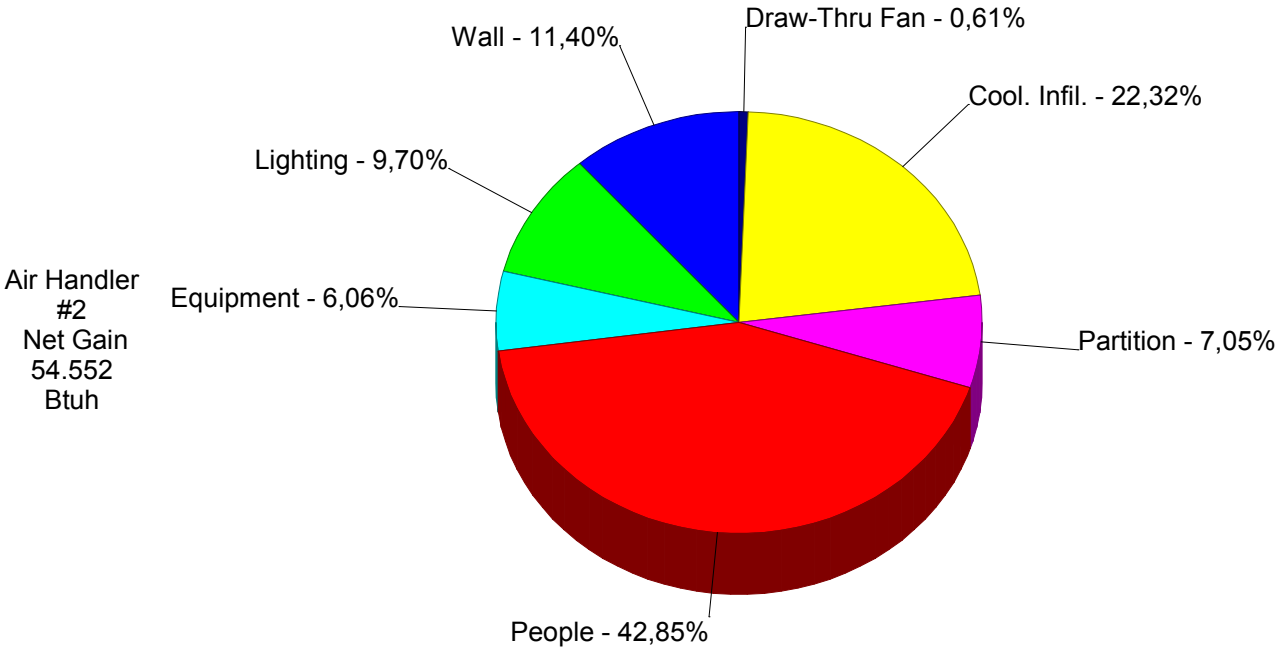
Air Handler #1 - UMA Salón Múltiple - Pie Charts

Air Handler #1 peaks in November at 1pm.



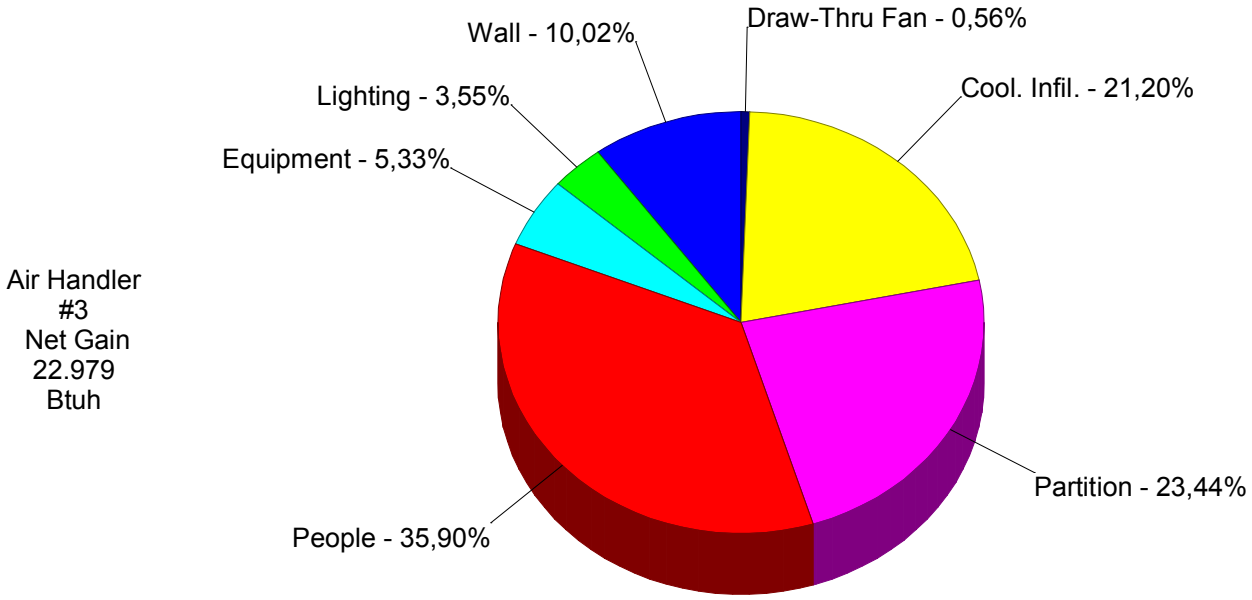
Air Handler #2 - UMA Tarima - Pie Charts

Air Handler #2 peaks in November at 1pm.



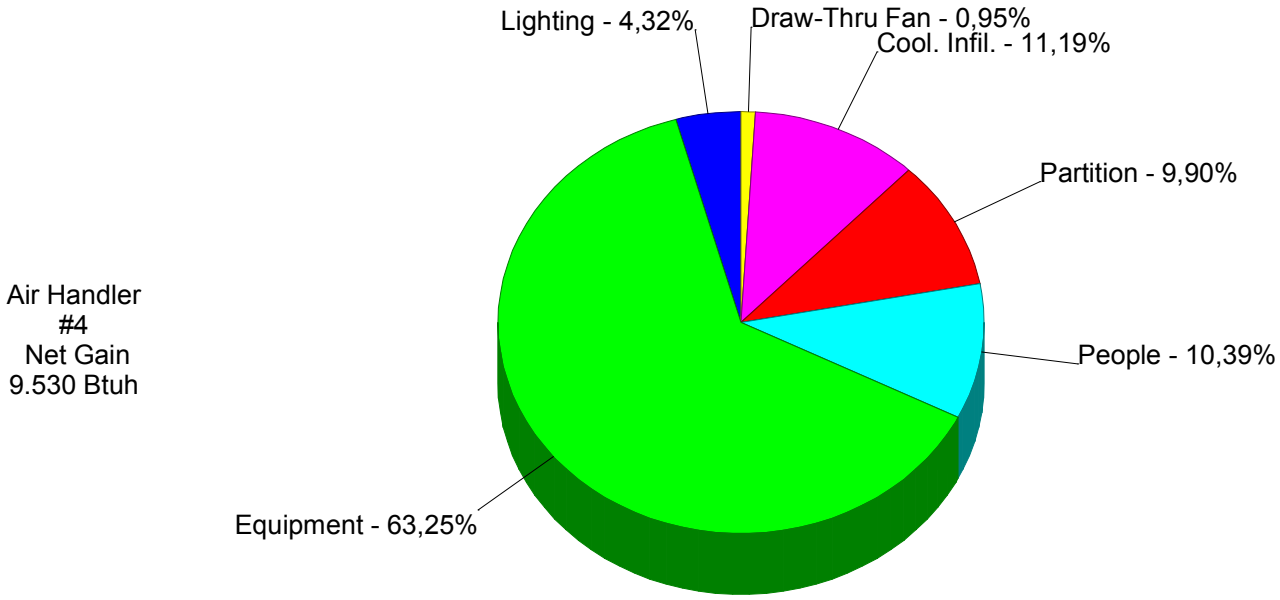
Air Handler #3 - UMA Backstage - Pie Charts

Air Handler #3 peaks in November at 1pm.



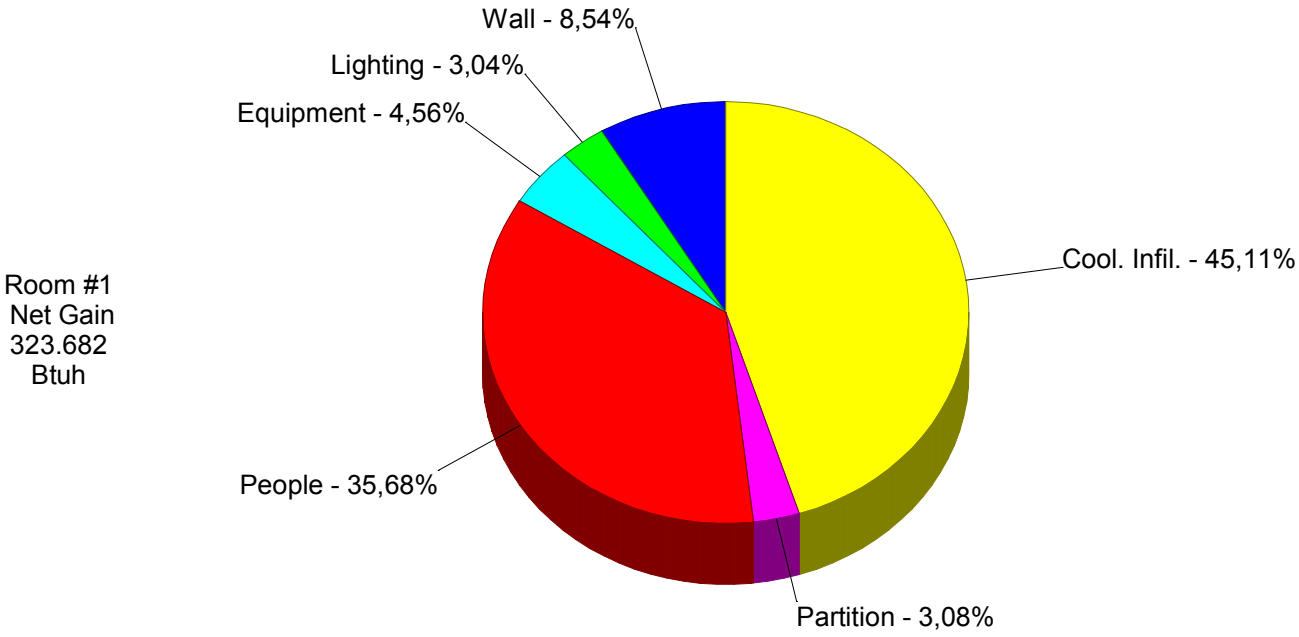
Air Handler #4 - Cuarto de Sonido - Pie Charts

Air Handler #4 peaks in December at 1pm.



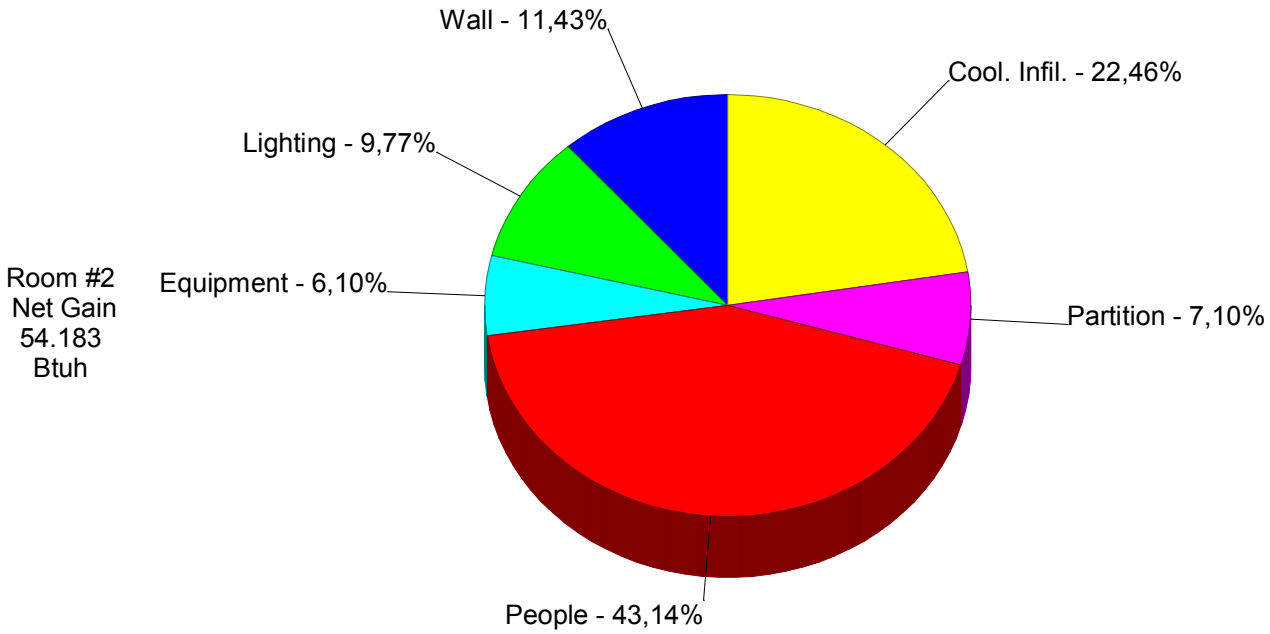
Room #1 - Salón Múltiple - Pie Charts

Room #1 peaks in November at 3pm



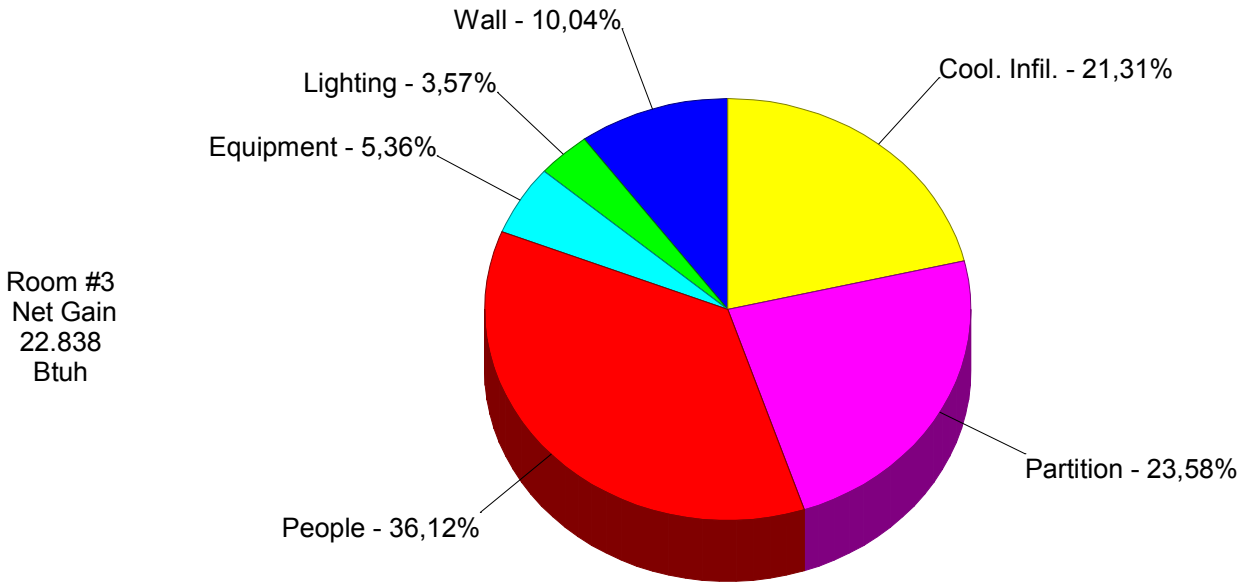
Room #2 - Tarima - Pie Charts

Room #2 peaks in November at 3pm



Room #3 - Backstage - Pie Charts

Room #3 peaks in November at 3pm



Room #4 - Cuarto de Sonido - Pie Charts

Room #4 peaks in December at 3pm

