# *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 - Salones y coordinadores.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 - 6pm | |
| Number of unique rooms in this project: | 5 | |

## 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 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 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 June at 4pm.

| 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 | 1.819 | 0 | 0,00 | 0 | 19.525 | 19.525 | 7,47 |
| Glass | 622 | 0 | 0,00 | 0 | 38.171 | 38.171 | 14,60 |
| Floor Slab | 0 | 0 | 0,00 | 0 | 0 | 0 | 0,00 |
| Skin Loads | | 0 | 0,00 | 0 | 57.696 | 57.696 | 22,06 |
| Lighting | 4.150 | 0 | 0,00 | 0 | 21.312 | 21.312 | 8,15 |
| Equipment | 5.814 | 0 | 0,00 | 0 | 21.061 | 21.061 | 8,05 |
| Pool Latent | 0 | 0 | 0,00 | 0 | 0 | 0 | 0,00 |
| People | 147 | 0 | 0,00 | 29.993 | 39.697 | 69.690 | 26,65 |
| Partition | 4.097 | 0 | 0,00 | 0 | 12.508 | 12.508 | 4,78 |
| 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. | 735 | 0 | 0,00 | 57.894 | 19.429 | 77.323 | 29,57 |
| Heat. Infil. | 0 | 0 | 0,00 | 0 | 0 | 0 | 0,00 |
| Draw-Thru Fan | 0 | 0 | 0,00 | 0 | 1.925 | 1.925 | 0,74 |
| 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 | 87.886 | 173.628 | 261.515 | 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 | 57.894 | 19.429 | 77.323 | 29,57 |
| Pretreated Air | 0 | 0,00 | 0 | 0 | 0 | 0,00 |
| Room Loads | 0 | 0,00 | 29.993 | 152.274 | 182.267 | 69,70 |
| Plenum Loads | 0 | 0,00 | 0 | 0 | 0 | 0,00 |
| Fan/Duct/Misc Loads | 0 | 0,00 | 0 | 1.925 | 1.925 | 0,74 |
| Building Totals | 0 | 0,00 | 87.886 | 173.628 | 261.515 | 100,00 |

## Check Figures

| | | |
|---|---|---|
| Total Building Supply Air (based on a 20° TD): | 8.157 | CFM |
| Total Building Vent. Air (0,00% of Supply): | 0 | CFM |
| Total Conditioned Air Space: | 4.150 | Sq.ft |
| Supply Air Per Unit Area: | 1,9655 | CFM/Sq.ft |
| Area Per Cooling Capacity: | 190,4 | Sq.ft/Ton |
| Cooling Capacity Per Area: | 0,0053 | 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: | 21,79 | Tons |

# *Air Handler #1 - UMA Sala de Arte - Summary Loads*

| Rm No | Description<br>Room Peak Time | Area<br>People<br>Volume | Htg.Loss<br>Htg.CFM<br>CFM/Sqft | Sen.Gain<br>Clg.CFM<br>CFM/Sqft | Lat.Gain<br>S.Exh<br>W.Exh | Htg.O.A.<br>Req.CFM<br>Act.CFM | Clg.O.A.<br>Req.CFM<br>Act.CFM |
|---|---|---|---|---|---|---|---|
| 1 | Sala de Arte | 1.624 | 0 | 52.696 | 30.779 | None | None |
| | 3pm June | 50 | 0 | 2.458 | 0 | 0 | 0 |
| | | 19.488 | 0,00 | 1,51 | 0 | 0 | 0 |
| | Room Peak Totals: | 1.624 | 0 | 52.696 | 30.779 | | |
| | Total Rooms: 1 | 50 | 0 | 2.458 | 0 | 0 | 0 |
| | Unique Rooms: 1 | 19.488 | 0,00 | 1,51 | 0 | 0 | 0 |

# Air Handler #1 - UMA Sala de Arte - Total Load Summary

| | |
|---|---|
| Air Handler Description: | UMA Sala de Arte Constant Volume - Sum of Peaks |
| Supply Air Fan: | Draw-Thru with program estimated horsepower of 0,23 HP |
| Fan Input: | 0% motor and fan efficiency with 0 in. water across the fan |
| Sensible Heat Ratio: | 0,63 |

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

| | |
|---|---|
| Air System Peak Time: | 2pm in June. |
| Outdoor Conditions: | Clg: 95° DB, 85° WB, 169,58 grains |
| Indoor Conditions: | Clg: 73° DB, 50% 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: | 45.843 Btuh | | |
| Infiltration sensible gain: | 6.693 Btuh | | |
| Draw-thru fan sensible gain: | 580 Btuh | | |
| Supply duct sensible gain: | 0 Btuh | | |
| Reserve sensible gain: | 0 Btuh | | |
| Total sensible gain on supply side of coil: | | | 53.116 Btuh |
| Cooling Supply Air: 53.276 / (,985 X 1,1 X 20) = | | 2.458 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: | | | 53.116 Btuh |
| Room space latent gain: | 11.000 Btuh | | |
| Infiltration latent gain: | 19.945 Btuh | | |
| Outside air latent gain: | 0 Btuh | | |
| Total latent gain on air handling system: | | | 30.945 Btuh |
| Total system sensible and latent gain: | | | 84.061 Btuh |

## Check Figures

| | |
|---|---|
| Total Air Handler Supply Air (based on a 20° TD): | 2.458 CFM |
| Total Air Handler Vent. Air (0,00% of Supply): | 0 CFM |
| Total Conditioned Air Space: | 1.624 Sq.ft |
| Supply Air Per Unit Area: | 1,5136 CFM/Sq.ft |
| Area Per Cooling Capacity: | 231,8 Sq.ft/Ton |
| Cooling Capacity Per Area: | 0,0043 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: | 7,01 Tons |

# *Air Handler #2 - UMA Informática - Summary Loads*

| Rm No | Description<br>Room Peak Time | Area<br>People<br>Volume | Htg.Loss<br>Htg.CFM<br>CFM/Sqft | Sen.Gain<br>Clg.CFM<br>CFM/Sqft | Lat.Gain<br>S.Exh<br>W.Exh | Htg.O.A.<br>Req.CFM<br>Act.CFM | Clg.O.A.<br>Req.CFM<br>Act.CFM |
|---|---|---|---|---|---|---|---|
| 2 | Informática | 714 | 0 | 52.785 | 22.154 | None | None |
| | 3pm June | 41 | 0 | 2.462 | 0 | 0 | 0 |
| | | 8.568 | 0,00 | 3,45 | 0 | 0 | 0 |
| | Room Peak Totals: | 714 | 0 | 52.785 | 22.154 | | |
| | Total Rooms: 1 | 41 | 0 | 2.462 | 0 | 0 | 0 |
| | Unique Rooms: 1 | 8.568 | 0,00 | 3,45 | 0 | 0 | 0 |

# Air Handler #2 - UMA Informática - Total Load Summary

| | |
|---|---|
| Air Handler Description: | UMA Informática Constant Volume - Sum of Peaks |
| Supply Air Fan: | Draw-Thru with program estimated horsepower of 0,23 HP |
| Fan Input: | 0% motor and fan efficiency with 0 in. water across the fan |
| Sensible Heat Ratio: | 0,70 |

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

| | |
|---|---|
| Air System Peak Time: | 2pm in June. |
| Outdoor Conditions: | Clg: 95° DB, 85° WB, 169,58 grains |
| Indoor Conditions: | Clg: 73° DB, 50% 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: | 47.479 | Btuh | | |
| Infiltration sensible gain: | 5.239 | Btuh | | |
| Draw-thru fan sensible gain: | 581 | Btuh | | |
| Supply duct sensible gain: | 0 | Btuh | | |
| Reserve sensible gain: | 0 | Btuh | | |
| Total sensible gain on supply side of coil: | | | | 53.299 Btuh |
| Cooling Supply Air: 53.366 / (,985 X 1,1 X 20) = | | | 2.462 | 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: | | | | 53.299 Btuh |
| Room space latent gain: | 6.673 | Btuh | | |
| Infiltration latent gain: | 15.611 | Btuh | | |
| Outside air latent gain: | 0 | Btuh | | |
| Total latent gain on air handling system: | | | | 22.284 Btuh |
| Total system sensible and latent gain: | | | | 75.583 Btuh |

## Check Figures

| | | |
|---|---|---|
| Total Air Handler Supply Air (based on a 20° TD): | 2.462 | CFM |
| Total Air Handler Vent. Air (0,00% of Supply): | 0 | CFM |
| Total Conditioned Air Space: | 714 | Sq.ft |
| Supply Air Per Unit Area: | 3,4485 | CFM/Sq.ft |
| Area Per Cooling Capacity: | 113,4 | 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: | 6,30 | Tons |

# *Air Handler #3 - Innovación - Summary Loads*

| Rm No | Description<br>Room Peak Time | Area<br>People<br>Volume | Htg.Loss<br>Htg.CFM<br>CFM/Sqft | Sen.Gain<br>Clg.CFM<br>CFM/Sqft | Lat.Gain<br>S.Exh<br>W.Exh | Htg.O.A.<br>Req.CFM<br>Act.CFM | Clg.O.A.<br>Req.CFM<br>Act.CFM |
|---|---|---|---|---|---|---|---|
| 3 | Innovación | 1.523 | 0 | 57.413 | 31.331 | None | None |
| | 5pm June | 50 | 0 | 2.678 | 0 | 0 | 0 |
| | | 18.276 | 0,00 | 1,76 | 0 | 0 | 0 |
| | Room Peak Totals: | 1.523 | 0 | 57.413 | 31.331 | | |
| | Total Rooms: 1 | 50 | 0 | 2.678 | 0 | 0 | 0 |
| | Unique Rooms: 1 | 18.276 | 0,00 | 1,76 | 0 | 0 | 0 |

# Air Handler #3 - Innovación - Total Load Summary

| | |
|---|---|
| Air Handler Description: | Innovación Constant Volume - Sum of Peaks |
| Supply Air Fan: | Draw-Thru with program estimated horsepower of 0,25 HP |
| Fan Input: | 0% motor and fan efficiency with 0 in. water across the fan |
| Sensible Heat Ratio: | 0,65 |

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

| | |
|---|---|
| Air System Peak Time: | 5pm in June. |
| Outdoor Conditions: | Clg: 94° DB, 85° WB, 171,68 grains |
| Indoor Conditions: | Clg: 73° DB, 50% 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: | 51.095 Btuh | | |
| Infiltration sensible gain: | 6.318 Btuh | | |
| Draw-thru fan sensible gain: | 632 Btuh | | |
| Supply duct sensible gain: | 0 Btuh | | |
| Reserve sensible gain: | 0 Btuh | | |
| Total sensible gain on supply side of coil: | | | 58.045 Btuh |
| Cooling Supply Air: 58.045 / (,985 X 1,1 X 20) = | | 2.678 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: | | | 58.045 Btuh |
| Room space latent gain: | 11.000 Btuh | | |
| Infiltration latent gain: | 20.331 Btuh | | |
| Outside air latent gain: | 0 Btuh | | |
| Total latent gain on air handling system: | | | 31.331 Btuh |
| Total system sensible and latent gain: | | | 89.376 Btuh |

## Check Figures

| | |
|---|---|
| Total Air Handler Supply Air (based on a 20° TD): | 2.678 CFM |
| Total Air Handler Vent. Air (0,00% of Supply): | 0 CFM |
| Total Conditioned Air Space: | 1.523 Sq.ft |
| Supply Air Per Unit Area: | 1,7584 CFM/Sq.ft |
| Area Per Cooling Capacity: | 204,5 Sq.ft/Ton |
| Cooling Capacity Per Area: | 0,0049 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: | 7,45 Tons |

# *Air Handler #4 - Coordinación 1 - Summary Loads*

| Rm No | Description<br>Room Peak Time | Area<br>People<br>Volume | Htg.Loss<br>Htg.CFM<br>CFM/Sqft | Sen.Gain<br>Clg.CFM<br>CFM/Sqft | Lat.Gain<br>S.Exh<br>W.Exh | Htg.O.A.<br>Req.CFM<br>Act.CFM | Clg.O.A.<br>Req.CFM<br>Act.CFM |
|---|---|---|---|---|---|---|---|
| 4 | Coordinación 1 | 148 | 0 | 7.815 | 1.857 | None | None |
| | 4pm December | 3 | 0 | 365 | 0 | 0 | 0 |
| | | 1.775 | 0,00 | 2,46 | 0 | 0 | 0 |
| | Room Peak Totals: | 148 | 0 | 7.815 | 1.857 | | |
| | Total Rooms: 1 | 3 | 0 | 365 | 0 | 0 | 0 |
| | Unique Rooms: 1 | 1.775 | 0,00 | 2,46 | 0 | 0 | 0 |

# Air Handler #4 - Coordinación 1 - Total Load Summary

| | |
|---|---|
| Air Handler Description: | Coordinación 1 Constant Volume - Sum of Peaks |
| Supply Air Fan: | Draw-Thru with program estimated horsepower of 0,03 HP |
| Fan Input: | 0% motor and fan efficiency with 0 in. water across the fan |
| Sensible Heat Ratio: | 0,81 |

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

| | |
|---|---|
| Air System Peak Time: | 4pm in December. |
| Outdoor Conditions: | Clg: 95° DB, 85° WB, 169,58 grains |
| Indoor Conditions: | Clg: 73° DB, 50% 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: | 7.414 Btuh | | |
| Infiltration sensible gain: | 402 Btuh | | |
| Draw-thru fan sensible gain: | 86 Btuh | | |
| Supply duct sensible gain: | 0 Btuh | | |
| Reserve sensible gain: | 0 Btuh | | |
| Total sensible gain on supply side of coil: | | | 7.901 Btuh |
| Cooling Supply Air: 7.901 / (,985 X 1,1 X 20) = | | 365 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: | | | 7.901 Btuh |
| Room space latent gain: | 660 Btuh | | |
| Infiltration latent gain: | 1.197 Btuh | | |
| Outside air latent gain: | 0 Btuh | | |
| Total latent gain on air handling system: | | | 1.857 Btuh |
| Total system sensible and latent gain: | | | 9.758 Btuh |

## Check Figures

| | |
|---|---|
| Total Air Handler Supply Air (based on a 20° TD): | 365 CFM |
| Total Air Handler Vent. Air (0,00% of Supply): | 0 CFM |
| Total Conditioned Air Space: | 148 Sq.ft |
| Supply Air Per Unit Area: | 2,4638 CFM/Sq.ft |
| Area Per Cooling Capacity: | 181,9 Sq.ft/Ton |
| Cooling Capacity Per Area: | 0,0055 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: | 0,81 Tons |

# *Air Handler #5 - Coordinación 2 - Summary Loads*

| Rm No | Description<br>Room Peak Time | Area<br>People<br>Volume | Htg.Loss<br>Htg.CFM<br>CFM/Sqft | Sen.Gain<br>Clg.CFM<br>CFM/Sqft | Lat.Gain<br>S.Exh<br>W.Exh | Htg.O.A.<br>Req.CFM<br>Act.CFM | Clg.O.A.<br>Req.CFM<br>Act.CFM |
|---|---|---|---|---|---|---|---|
| 5 | Coordinación 2 | 141 | 0 | 4.165 | 1.847 | None | None |
| | 3pm December | 3 | 0 | 194 | 0 | 0 | 0 |
| | | 1.696 | 0,00 | 1,37 | 0 | 0 | 0 |
| | Room Peak Totals: | 141 | 0 | 4.165 | 1.847 | | |
| | Total Rooms: 1 | 3 | 0 | 194 | 0 | 0 | 0 |
| | Unique Rooms: 1 | 1.696 | 0,00 | 1,37 | 0 | 0 | 0 |

# Air Handler #5 - Coordinación 2 - Total Load Summary

| | |
|---|---|
| Air Handler Description: | Coordinación 2 Constant Volume - Sum of Peaks |
| Supply Air Fan: | Draw-Thru with program estimated horsepower of 0,02 HP |
| Fan Input: | 0% motor and fan efficiency with 0 in. water across the fan |
| Sensible Heat Ratio: | 0,69 |

--- 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 |

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: | 3.754 Btuh | | |
| Infiltration sensible gain: | 376 Btuh | | |
| Draw-thru fan sensible gain: | 46 Btuh | | |
| Supply duct sensible gain: | 0 Btuh | | |
| Reserve sensible gain: | 0 Btuh | | |
| Total sensible gain on supply side of coil: | | | 4.176 Btuh |
| Cooling Supply Air: 4.211 / (,985 X 1,1 X 20) = | | 194 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: | | | 4.176 Btuh |
| Room space latent gain: | 660 Btuh | | |
| Infiltration latent gain: | 1.223 Btuh | | |
| Outside air latent gain: | 0 Btuh | | |
| Total latent gain on air handling system: | | | 1.883 Btuh |
| Total system sensible and latent gain: | | | 6.059 Btuh |

## Check Figures

| | | |
|---|---|---|
| Total Air Handler Supply Air (based on a 20° TD): | 194 | CFM |
| Total Air Handler Vent. Air (0,00% of Supply): | 0 | CFM |
| Total Conditioned Air Space: | 141 | Sq.ft |
| Supply Air Per Unit Area: | 1,3744 | CFM/Sq.ft |
| Area Per Cooling Capacity: | 280,0 | Sq.ft/Ton |
| Cooling Capacity Per Area: | 0,0036 | 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: | 0,50 | 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-Sala de Arte peaks (sensible) in June at 3pm, Air Handler 1 (UMA Sala de Arte), Zone 0, 1.624,0 x 1,0, Construction Type: 10 (Medium)** | | | | | | | | |
| Wall-5-21-E-D | 239 | 1 | 34,1 | 0,290 | 2.359 | | 0,000 | 0 |
| Wall-6-111-E-D | 623 | 1 | 38,1 | 0,290 | 6.896 | | 0,000 | 0 |
| Partition-1-3 | 62,39999 | | 10/0 | 0,290 | 181 | | 0,000 | 0 |
| Partition door-2-3 | 35,4 | | 10/0 | 0,290 | 103 | | 0,000 | 0 |
| Partition-3-3 | 39 | | 10/0 | 0,290 | 113 | | 0,000 | 0 |
| Partition-4-3 | 519 | | 10/0 | 0,290 | 1.505 | | 0,000 | 0 |
| Partition-7-3 | 335,4 | | 10/0 | 0,290 | 973 | | 0,000 | 0 |
| Gls-21°-1-90-Tran | 142,3 | 1,000 | 21 | 1,144 | 3.419 | | 0,000 | 0 |
| 0%S-0-NS-Solar | 142,3 | 0,950 | 95 | 0,377 | 4.837 | | | |
| Lights-Prof=2 | 1.624 | 1,000 | | | 7.758 | | | |
| Equipment-Prof=3 | 302 | 1,000 | | | 1.030 | 0 | | |
| People-Prof=1 | 50,0 | 1,000 | | | 12.500 | 10.000 | | |
| Cool. Infil.CFM/person | 250 | | | | 6.231 | 17.981 | | |
| Heat. Infil.AC/hr | 0 | | | | | | 0,000 | 0 |
| Sub-total | | | | | 47.905 | 27.981 | | 0 |
| Safety factors: | | | | | +10% | +10% | | +10% |
| Total w/ safety factors: | | | | | 52.696 | 30.779 | | 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 A (model C) 2.3 GHz processor, 3 GB RAM | 97 | watts | 0 | watts | 331 | 0 |
| Flat-panel monitor, Manufacturer X (model A) 30 in. screen | 90 | watts | 0 | watts | 307 | 0 |
| Multifunction (copy, print, scan): Small, desktop type | 30 | watts | 0 | Btuh | 26 | 0 |
| TV | 215 | watts | 0 | watts | 367 | 0 |
| Total | | | | | 1.030 | 0 |

## Lighting Cooling Loads

| Item Name | Quantity | Quantity Type | Special Allowance Factor | Space Fraction | Occur-rences | Usage Factor | Load (Btuh) |
|---|---|---|---|---|---|---|---|
| Classroom/lecture/training | 1,4 | watts/sq.ft. | 1 | 1 | 1 | 1 | 7.758 |
| Miscellaneous Lighting | -649,5999 | watts | 1 | 0 | 1 | 1 | 0 |
| Total | | | | | | | 7.758 |

| **Room 2-Informática peaks (sensible) in June at 3pm, Air Handler 2 (UMA Informática), Zone 0, 714,0 x 1,0, Construction Type: 10 (Medium)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wall-2-21-E-D | 115 | 1 | 34,1 | 0,290 | 1.138 | | 0,000 | 0 |
| Partition-1-3 | 322,2 | | 10/0 | 0,290 | 934 | | 0,000 | 0 |
| Partition-3-3 | 210 | | 10/0 | 0,290 | 609 | | 0,000 | 0 |
| Partition-4-3 | 37,8 | | 10/0 | 0,290 | 110 | | 0,000 | 0 |
| Partition-5-3 | 75,6 | | 10/0 | 0,290 | 219 | | 0,000 | 0 |
| Partition door-6-3 | 35,4 | | 10/0 | 0,290 | 103 | | 0,000 | 0 |

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

| Load Description | Unit Quan | -SC- CFAC | CLTD SHGF | U.Fac -CLF- | Sen. Gain | Lat. Gain | Htg. Mult. | Htg. Loss |
|---|---|---|---|---|---|---|---|---|
| Partition-7-3 | 294 | | 10/0 | 0,290 | 853 | | 0,000 | 0 |
| Gls-21°-1-90-Tran | 216,7 | 1,000 | 21 | 1,144 | 5.206 | | 0,000 | 0 |
| 0%S-0-NS-Solar | 216,7 | 0,950 | 95 | 0,377 | 7.364 | | | |
| Lights-Prof=2 | 714 | 1,000 | | | 3.411 | | | |
| Equipment-Prof=2 | 4.446 | 1,000 | | | 15.171 | 0 | | |
| People-Prof=1 | 41,0 | 1,000 | | | 10.045 | 6.355 | | |
| Cool. Infil.CFM/person | 205 | | | | 5.110 | 14.744 | | |
| Heat. Infil.AC/hr | 0 | | | | | | 0,000 | 0 |
| Sub-total | | | | | 50.271 | 21.099 | | 0 |
| Safety factors: | | | | | +5% | +5% | | +5% |
| Total w/ safety factors: | | | | | 52.785 | 22.154 | | 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 | 10.772 | 0 |
| Flat-panel monitor, Manufacturer Y (model A), 19 in. screen | 28 | watts | 0 | watts | 3.917 | 0 |
| Multifunction (copy, print, scan): Medium, desktop type | 135 | watts | 0 | Btuh | 115 | 0 |
| TV | 215 | watts | 0 | watts | 367 | 0 |
| Total | | | | | 15.171 | 0 |

### Lighting Cooling Loads

| Item Name | Quantity | Quantity Type | Special Allowance Factor | Space Fraction | Occur-rences | Usage Factor | Load (Btuh) |
|---|---|---|---|---|---|---|---|
| Classroom/lecture/training | 1,4 | watts/sq.ft. | 1 | 1 | 1 | 1 | 3.411 |
| Miscellaneous Lighting | -285,6 | watts | 1 | 0 | 1 | 1 | 0 |
| Total | | | | | | | 3.411 |

### Room 3-Innovación peaks (sensible) in June at 5pm, Air Handler 3 (Innovación), Zone 0, 1.523,0 x 1,0, Construction Type: 10 (Medium)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wall-1-291-E-D | 641 | 1 | 38,3 | 0,290 | 7.117 | | 0,000 | 0 |
| Wall-2-21-E-D | 86 | 1 | 36,3 | 0,290 | 905 | | 0,000 | 0 |
| Partition-3-3 | 641,4 | | 10/0 | 0,290 | 1.860 | | 0,000 | 0 |
| Partition-4-3 | 41,4 | | 10/0 | 0,290 | 120 | | 0,000 | 0 |
| Partition-5-3 | 29,99999 | | 10/0 | 0,290 | 87 | | 0,000 | 0 |
| Partition door-6-3 | 35,4 | | 10/0 | 0,290 | 103 | | 0,000 | 0 |
| Partition-7-3 | 64,8 | | 10/0 | 0,290 | 188 | | 0,000 | 0 |
| Partition door-8-3 | 35,4 | | 10/0 | 0,290 | 103 | | 0,000 | 0 |
| Partition-9-3 | 65,39999 | | 10/0 | 0,290 | 190 | | 0,000 | 0 |
| Partition-10-3 | 154,8 | | 10/0 | 0,290 | 449 | | 0,000 | 0 |
| Partition door-11-3 | 35,4 | | 10/0 | 0,290 | 103 | | 0,000 | 0 |
| Gls-21°-1-90-Tran | 245,8 | 1,000 | 20 | 1,144 | 5.623 | | 0,000 | 0 |
| 0%S-0-NS-Solar | 245,8 | 0,950 | 95 | 0,339 | 7.522 | | | |
| Lights-Prof=2 | 1.523 | 1,000 | | | 7.275 | | | |
| Equipment-Prof=3 | 676 | 1,000 | | | 2.307 | 0 | | |

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

| Load Description | Unit Quan | -SC- CFAC | CLTD SHGF | U.Fac -CLF- | Sen. Gain | Lat. Gain | Htg. Mult. | Htg. Loss |
|---|---|---|---|---|---|---|---|---|
| People-Prof=1 | 50,0 | 1,000 | | | 12.500 | 10.000 | | |
| Cool. Infil.CFM/person | 250 | | | | 5.744 | 18.483 | | |
| Heat. Infil.AC/hr | 0 | | | | | | 0,000 | 0 |
| Sub-total | | | | | 52.193 | 28.483 | | 0 |
| Safety factors: | | | | | +10% | +10% | | +10% |
| Total w/ safety factors: | | | | | 57.413 | 31.331 | | 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 A (model C) 2.3 GHz processor, 3 GB RAM | 97 | watts | 0 | watts | 993 | 0 |
| Flat-panel monitor, Manufacturer X (model A) 30 in. screen | 90 | watts | 0 | watts | 921 | 0 |
| Multifunction (copy, print, scan): Small, desktop type | 30 | watts | 0 | Btuh | 26 | 0 |
| TV | 215 | watts | 0 | watts | 367 | 0 |
| Total | | | | | 2.307 | 0 |

### Lighting Cooling Loads

| Item Name | Quantity | Quantity Type | Special Allowance Factor | Space Fraction | Occur-rences | Usage Factor | Load (Btuh) |
|---|---|---|---|---|---|---|---|
| Classroom/lecture/training | 1,4 | watts/sq.ft. | 1 | 1 | 1 | 1 | 7.275 |
| Miscellaneous Lighting | -609,2 | watts | 1 | 0 | 1 | 1 | 0 |
| Total | | | | | | | 7.275 |

### Room 4-Coordinación 1 peaks (sensible) in December at 4pm, Air Handler 4 (Coordinación 1), Zone 0, 13,5 x 11,0, Construction Type: 10 (Medium)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wall-4-201-E-D | 79 | 1 | 47,1 | 0,290 | 1.084 | | 0,000 | 0 |
| Door-5-201-E-D | 35 | 1 | 47,1 | 0,290 | 484 | | 0,000 | 0 |
| Partition-1-3 | 161,4 | | 10/0 | 0,290 | 468 | | 0,000 | 0 |
| Partition-2-2 | 132 | | 5/0 | 0,290 | 191 | | 0,000 | 0 |
| Partition-3-3 | 161,4 | | 10/0 | 0,290 | 468 | | 0,000 | 0 |
| Gls-201°-1-90-Tran | 17,2 | 1,000 | 21 | 1,144 | 414 | | 0,000 | 0 |
| 0%S-0-NS-Solar | 17,2 | 0,950 | 175 | 0,580 | 1.661 | | | |
| Lights-Prof=2 | 148 | 1,000 | | | 555 | | | |
| Equipment-Prof=3 | 195 | 1,000 | | | 664 | 0 | | |
| People-Prof=1 | 3,0 | 1,000 | | | 750 | 600 | | |
| Cool. Infil.CFM/person | 15 | | | | 365 | 1.088 | | |
| Heat. Infil.AC/hr | 0 | | | | | | 0,000 | 0 |
| Sub-total | | | | | 7.105 | 1.688 | | 0 |
| Safety factors: | | | | | +10% | +10% | | +10% |
| Total w/ safety factors: | | | | | 7.815 | 1.857 | | 0 |

### Equipment Cooling Loads

# *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) |
|---|---|---|---|---|---|---|
| Desktop computer, Manufacturer A (model C) 2.3 GHz processor, 3 GB RAM | 97 | watts | 0 | watts | 331 | 0 |
| Flat-panel monitor, Manufacturer X (model A) 30 in. screen | 90 | watts | 0 | watts | 307 | 0 |
| Multifunction (copy, print, scan): Small, desktop type | 30 | watts | 0 | Btuh | 26 | 0 |
| Total | | | | | 664 | 0 |

## Lighting Cooling Loads

| Item Name | Quantity | Quantity Type | Special Allowance Factor | Space Fraction | Occur-rences | Usage Factor | Load (Btuh) |
|---|---|---|---|---|---|---|---|
| Office-enclosed | 1,1 | watts/sq.ft. | 1 | 1 | 1 | 1 | 555 |
| Miscellaneous Lighting | -14,745 | watts | 1 | 0 | 1 | 1 | 0 |
| Total | | | | | | | 555 |

## Room 5-Coordinación 2 peaks (sensible) in December at 3pm, Air Handler 5 (Coordinación 2), Zone 0, 12,9 x 11,0, Construction Type: 22 (Medium)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Partition-1-3 | 154,2 | | 10/0 | 0,290 | 447 | | 0,000 | 0 |
| Partition-2-3 | 96,6 | | 10/0 | 0,290 | 280 | | 0,000 | 0 |
| Partition door-3-3 | 35,4 | | 10/0 | 0,290 | 103 | | 0,000 | 0 |
| Partition-4-3 | 154,2 | | 10/0 | 0,290 | 447 | | 0,000 | 0 |
| Partition-5-2 | 132 | | 5/0 | 0,290 | 191 | | 0,000 | 0 |
| Lights-Prof=2 | 141 | 1,000 | | | 531 | | | |
| Equipment-Prof=3 | 195 | 1,000 | | | 664 | 0 | | |
| People-Prof=1 | 3,0 | 1,000 | | | 750 | 600 | | |
| Cool. Infil.CFM/person | 15 | | | | 374 | 1.079 | | |
| Heat. Infil.AC/hr | 0 | | | | | | 0,000 | 0 |
| Sub-total | | | | | 3.787 | 1.679 | | 0 |
| Safety factors: | | | | | +10% | +10% | | +10% |
| Total w/ safety factors: | | | | | 4.165 | 1.847 | | 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 A (model C) 2.3 GHz processor, 3 GB RAM | 97 | watts | 0 | watts | 331 | 0 |
| Flat-panel monitor, Manufacturer X (model A) 30 in. screen | 90 | watts | 0 | watts | 307 | 0 |
| Multifunction (copy, print, scan): Small, desktop type | 30 | watts | 0 | Btuh | 26 | 0 |
| Total | | | | | 664 | 0 |

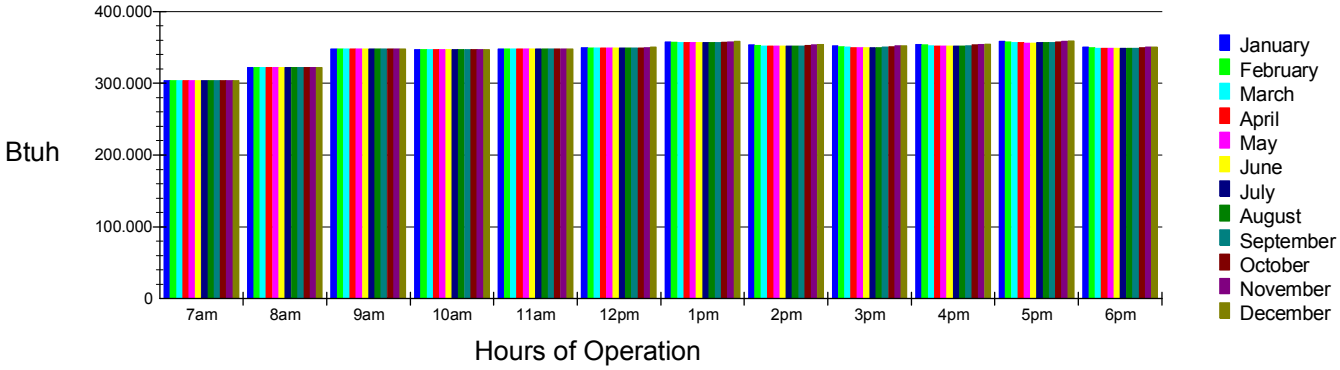
## Lighting Cooling Loads

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

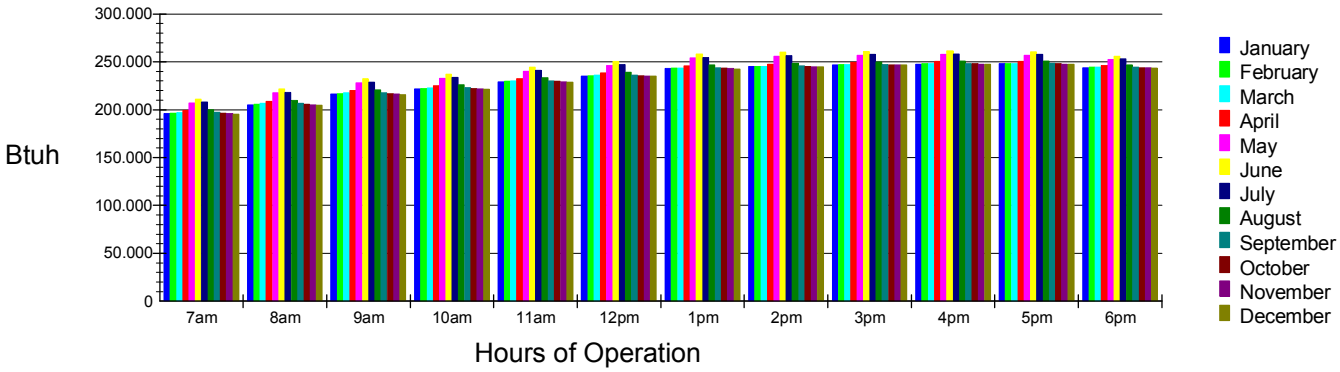
| Item Name | Quantity | Quantity Type | Special Allowance Factor | Space Fraction | Occur-rences | Usage Factor | Load (Btuh) |
|---|---|---|---|---|---|---|---|
| Office-enclosed | 1,1 | watts/sq.ft. | 1 | 1 | 1 | 1 | 531 |
| Miscellaneous Lighting | -14,48502 | watts | 1 | 0 | 1 | 1 | 0 |
| Total | | | | | | | 531 |

# Building Profile Graphs

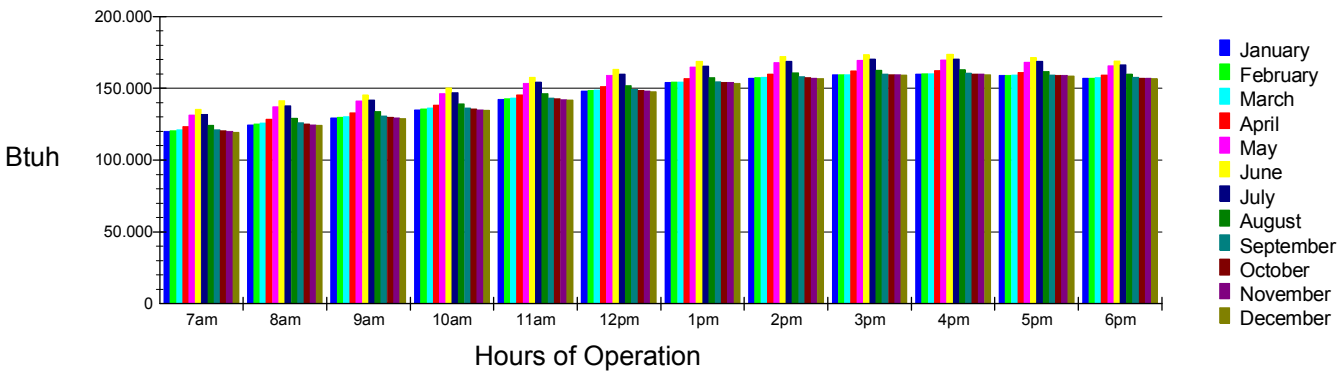
## Building Adjusted Load



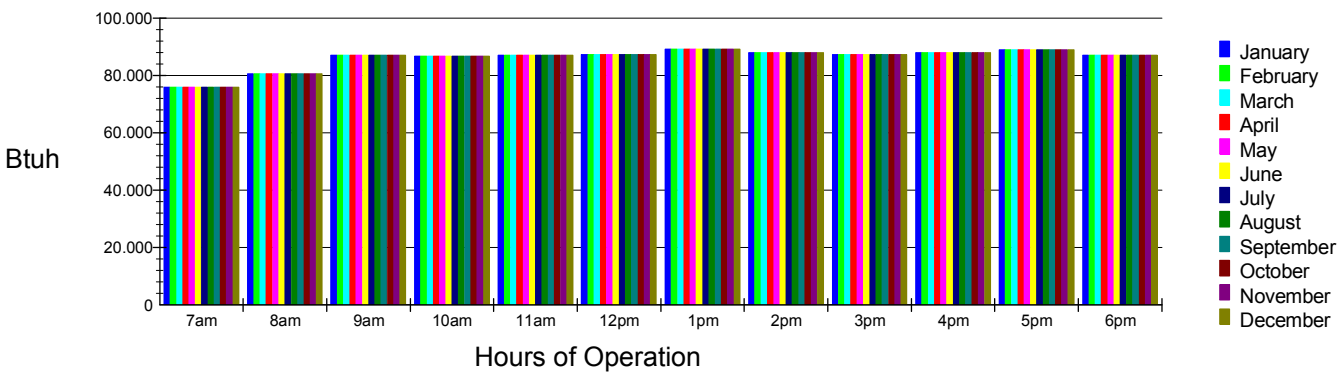

## Building Net Load




## Building Sensible Load




## Building Latent Load



# *Air System #1 (UMA Sala de Arte) Psychrometric Analysis*

| System Load Analysis | Latent | Grains | Sensible | Temp | CFM |
|---|---|---|---|---|---|
| Leaving Coil Condition | | 42,317 | | 53,000 | |
| Draw-Thru Fan | | | 580 | 0,218 | 27 |
| Misc Load on Supply Side | 0 | 0,000 | 0 | 0,000 | 0 |
| Supply Air Duct | | | 0 | 0,000 | 0 |
| Room Loads | 30.945 | 18,792 | 52.696 | 19,782 | 2.431 |
| Sensible Reserve | | | 0 | 0,000 | 0 |
| Room Condition | 30.945 | 61,109 | 53.276 | 73,000 | 2.458 |
| 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 | 30.945 | 61,109 | 53.276 | 73,000 | 2.458 |

## 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 | 2.458 | x ( | 73,0 | - | 53,0 | ) = | 53.276 Btuh |
| TLH | = | 0,985 | x | 0,68 | x | 2.458 | x ( | 61,1 | - | 42,3 | ) = | 30.945 Btuh |
| SUM | = | | | | | | | | | | | 84.220 Btuh |
| GTH | = | 0,985 | x | 4,50 | x | 2.458 | x ( | 27,1 | - | 19,3 | ) = | 84.885 Btuh |
| Total System Load | | | | | | | | | | | = | 84.061 Btuh |

## Chilled and Hot Water Flow Rates and Steam Requirement

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cooling GPM = | 84.885 | / ( | 10,00 | x | 500 | ) = | 17,0 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: | 60,79 | |
| Relative humidity: | 49,83 | |
| Enthalpy: | 27,07 | Btu/lbm |

## Entering Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

## Leaving Cooling Coil Conditions

| | | |
|---|---|---|
| Dry bulb temperature: | 53,00 | |
| Wet bulb temperature: | 48,00 | |
| Relative humidity: | 70,05 | |
| Enthalpy: | 19,28 | Btu/lbm |

## Leaving Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

# *Air System #2 (UMA Informática) Psychrometric Analysis*

| System Load Analysis | Latent | Grains | Sensible | Temp | CFM |
|---|---|---|---|---|---|
| Leaving Coil Condition | | 47,660 | | 53,000 | |
| Draw-Thru Fan | | | 581 | 0,218 | 27 |
| Misc Load on Supply Side | 0 | 0,000 | 0 | 0,000 | 0 |
| Supply Air Duct | | | 0 | 0,000 | 0 |
| Room Loads | 22.284 | 13,510 | 52.785 | 19,782 | 2.435 |
| Sensible Reserve | | | 0 | 0,000 | 0 |
| Room Condition | 22.284 | 61,169 | 53.366 | 73,000 | 2.462 |
| 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 | 22.284 | 61,169 | 53.366 | 73,000 | 2.462 |

## 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 | 2.462 | x ( | 73,0 | - | 53,0 | ) = | 53.366 Btuh |
| TLH | = | 0,985 | x | 0,68 | x | 2.462 | x ( | 61,2 | - | 47,7 | ) = | 22.284 Btuh |
| SUM | = | | | | | | | | | | | 75.650 Btuh |
| GTH | = | 0,985 | x | 4,50 | x | 2.462 | x ( | 27,1 | - | 20,1 | ) = | 76.094 Btuh |
| Total System Load | | | | | | | | | | | = | 75.583 Btuh |

## Chilled and Hot Water Flow Rates and Steam Requirement

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cooling GPM = | 76.094 | / ( | 10,00 | x | 500 | ) = | 15,2 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: | 60,81 | |
| Relative humidity: | 49,89 | |
| Enthalpy: | 27,08 | Btu/lbm |

## Entering Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

## Leaving Cooling Coil Conditions

| | | |
|---|---|---|
| Dry bulb temperature: | 53,00 | |
| Wet bulb temperature: | 49,51 | |
| Relative humidity: | 78,78 | |
| Enthalpy: | 20,11 | Btu/lbm |

## Leaving Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

# *Air System #3 (Innovación) Psychrometric Analysis*

| System Load Analysis | Latent | Grains | Sensible | Temp | CFM |
|---|---|---|---|---|---|
| Leaving Coil Condition | | 43,665 | | 53,000 | |
| Draw-Thru Fan | | | 632 | 0,218 | 29 |
| Misc Load on Supply Side | 0 | 0,000 | 0 | 0,000 | 0 |
| Supply Air Duct | | | 0 | 0,000 | 0 |
| Room Loads | 31.331 | 17,463 | 57.413 | 19,782 | 2.649 |
| Sensible Reserve | | | 0 | 0,000 | 0 |
| Room Condition | 31.331 | 61,128 | 58.045 | 73,000 | 2.678 |
| 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 | 31.331 | 61,128 | 58.045 | 73,000 | 2.678 |

## 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 | 2.678 | x ( | 73,0 | - | 53,0 | ) = | 58.044 Btuh |
| TLH | = | 0,985 | x | 0,68 | x | 2.678 | x ( | 61,1 | - | 43,7 | ) = | 31.331 Btuh |
| SUM | = | | | | | | | | | | | 89.375 Btuh |
| GTH | = | 0,985 | x | 4,50 | x | 2.678 | x ( | 27,1 | - | 19,5 | ) = | 90.039 Btuh |
| Total System Load | | | | | | | | | | | = | 89.376 Btuh |

## Chilled and Hot Water Flow Rates and Steam Requirement

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cooling GPM | = | 90.039 / ( | 10,00 x | 500 | ) | = | 18,0 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: | 60,80 | |
| Relative humidity: | 49,85 | |
| Enthalpy: | 27,07 | Btu/lbm |

## Entering Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

## Leaving Cooling Coil Conditions

| | | |
|---|---|---|
| Dry bulb temperature: | 53,00 | |
| Wet bulb temperature: | 48,39 | |
| Relative humidity: | 72,26 | |
| Enthalpy: | 19,49 | Btu/lbm |

## Leaving Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

# *Air System #4 (Coordinación 1) Psychrometric Analysis*

| System Load Analysis | Latent | Grains | Sensible | Temp | CFM |
|---|---|---|---|---|---|
| Leaving Coil Condition | | 53,625 | | 53,000 | |
| Draw-Thru Fan | | | 86 | 0,218 | 4 |
| Misc Load on Supply Side | 0 | 0,000 | 0 | 0,000 | 0 |
| Supply Air Duct | | | 0 | 0,000 | 0 |
| Room Loads | 1.857 | 7,603 | 7.815 | 19,785 | 361 |
| Sensible Reserve | | | 0 | 0,000 | 0 |
| Room Condition | 1.857 | 61,228 | 7.901 | 73,000 | 365 |
| 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 | 1.857 | 61,228 | 7.901 | 73,000 | 365 |

## 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 | 365 | x ( 73,0 | - | 53,0 | ) = | 7.900 | Btuh |
| TLH | = | 0,985 | x | 0,68 | x | 365 | x ( 61,2 | - | 53,6 | ) = | 1.857 | Btuh |
| SUM | = | | | | | | | | | | 9.757 | Btuh |
| GTH | = | 0,985 | x | 4,50 | x | 365 | x ( 27,1 | - | 21,0 | ) = | 9.786 | Btuh |
| Total System Load | | | | | | | | | | = | 9.758 | Btuh |

## Chilled and Hot Water Flow Rates and Steam Requirement

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cooling GPM = | 9.786 | / ( | 10,00 | x | 500 | ) = | 2,0 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: | 60,82 | |
| Relative humidity: | 49,93 | |
| 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: | 51,14 | |
| Relative humidity: | 88,51 | |
| Enthalpy: | 21,03 | Btu/lbm |

## Leaving Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

# *Air System #5 (Coordinación 2) Psychrometric Analysis*

| System Load Analysis | Latent | Grains | Sensible | Temp | CFM |
|---|---|---|---|---|---|
| Leaving Coil Condition | | 46,686 | | 53,000 | |
| Draw-Thru Fan | | | 46 | 0,218 | 2 |
| Misc Load on Supply Side | 0 | 0,000 | 0 | 0,000 | 0 |
| Supply Air Duct | | | 0 | 0,000 | 0 |
| Room Loads | 1.883 | 14,470 | 4.165 | 19,785 | 192 |
| Sensible Reserve | | | 0 | 0,000 | 0 |
| Room Condition | 1.883 | 61,156 | 4.211 | 73,000 | 194 |
| 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 | 1.883 | 61,156 | 4.211 | 73,000 | 194 |

## 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 | 194 | x ( | 73,0 | - | 53,0 | ) = | 4.211 Btuh |
| TLH | = | 0,985 | x | 0,68 | x | 194 | x ( | 61,2 | - | 46,7 | ) = | 1.883 Btuh |
| SUM | = | | | | | | | | | | | 6.094 Btuh |
| GTH | = | 0,985 | x | 4,50 | x | 194 | x ( | 27,1 | - | 20,0 | ) = | 6.132 Btuh |
| Total System Load | | | | | | | | | | | = | 6.059 Btuh |

## Chilled and Hot Water Flow Rates and Steam Requirement

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cooling GPM = | 6.132 | / ( | 10,00 | x | 500 | ) | = 1,2 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: | 60,81 | |
| Relative humidity: | 49,89 | |
| Enthalpy: | 27,07 | Btu/lbm |

## Entering Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

## Leaving Cooling Coil Conditions

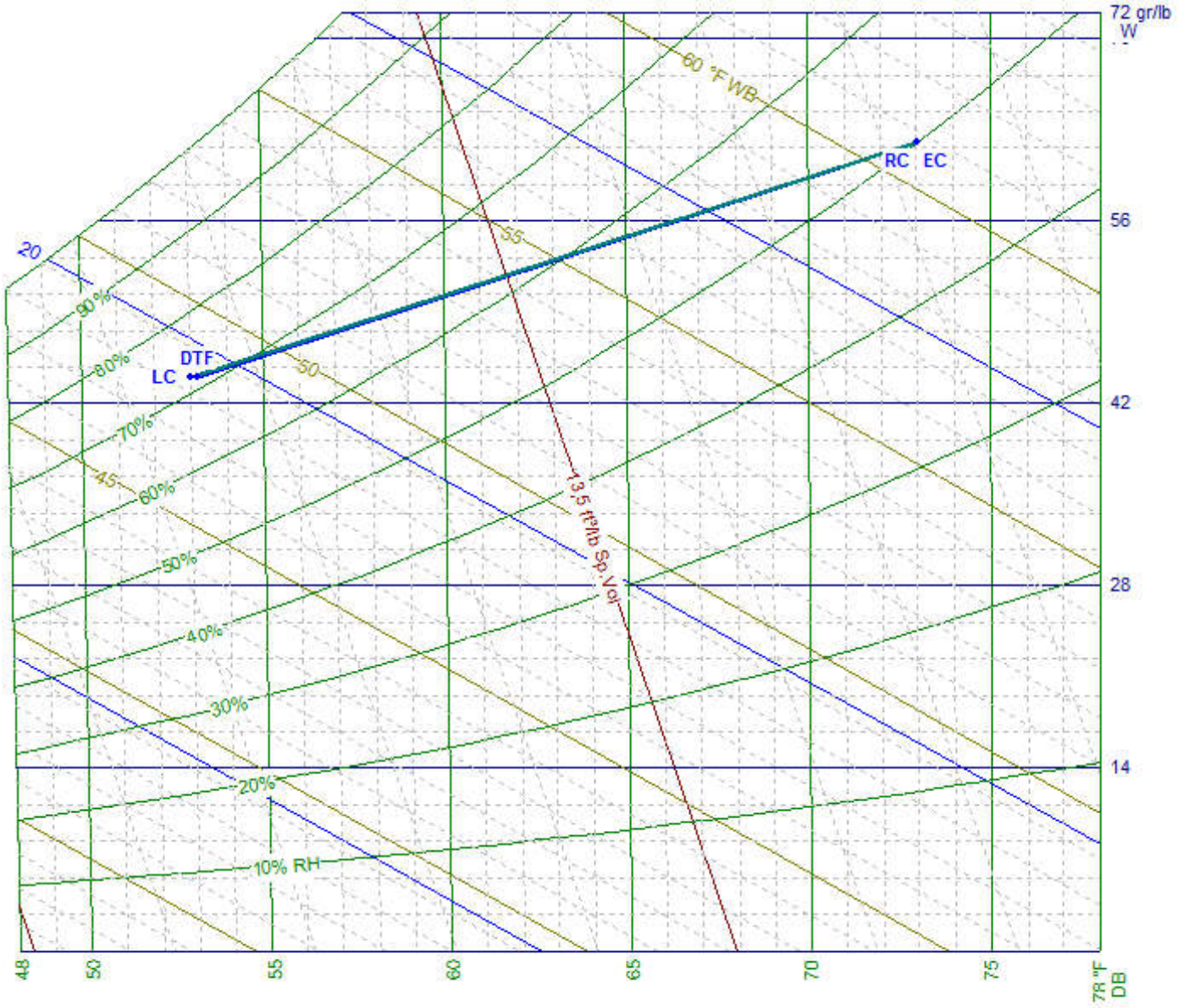
| | | |
|---|---|---|
| Dry bulb temperature: | 53,00 | |
| Wet bulb temperature: | 49,24 | |
| Relative humidity: | 77,20 | |
| Enthalpy: | 19,95 | Btu/lbm |

## Leaving Heating Coil Conditions

| | |
|---|---|
| Dry bulb temperature: | ,00 |

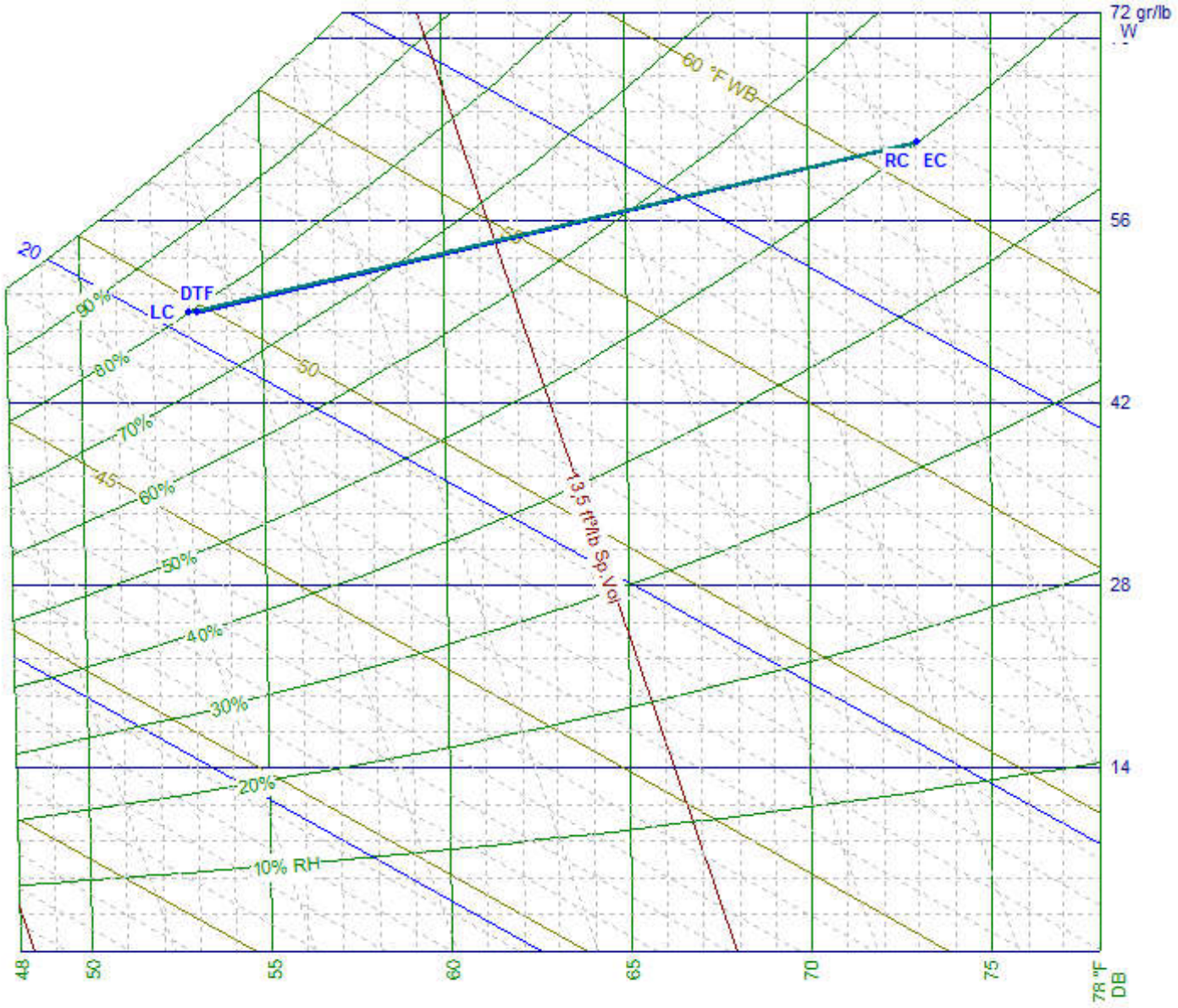
# *Air System #1 (UMA Sala de Arte) Psychrometric Chart*

| | | | |
|---|---|---|---|
| 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 |



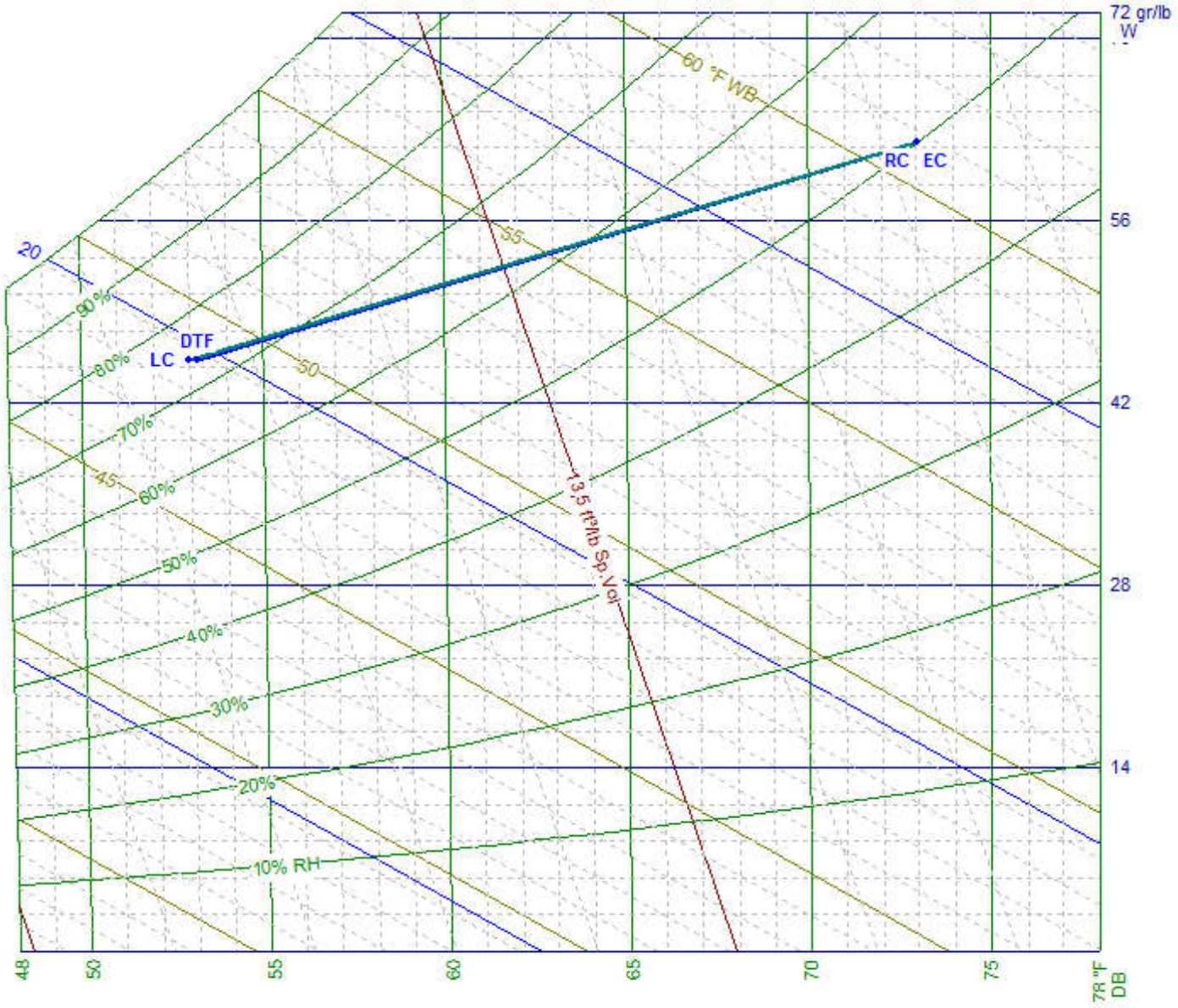
# *Air System #2 (UMA Informática) Psychrometric Chart*

| | | | |
|---|---|---|---|
| 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 |



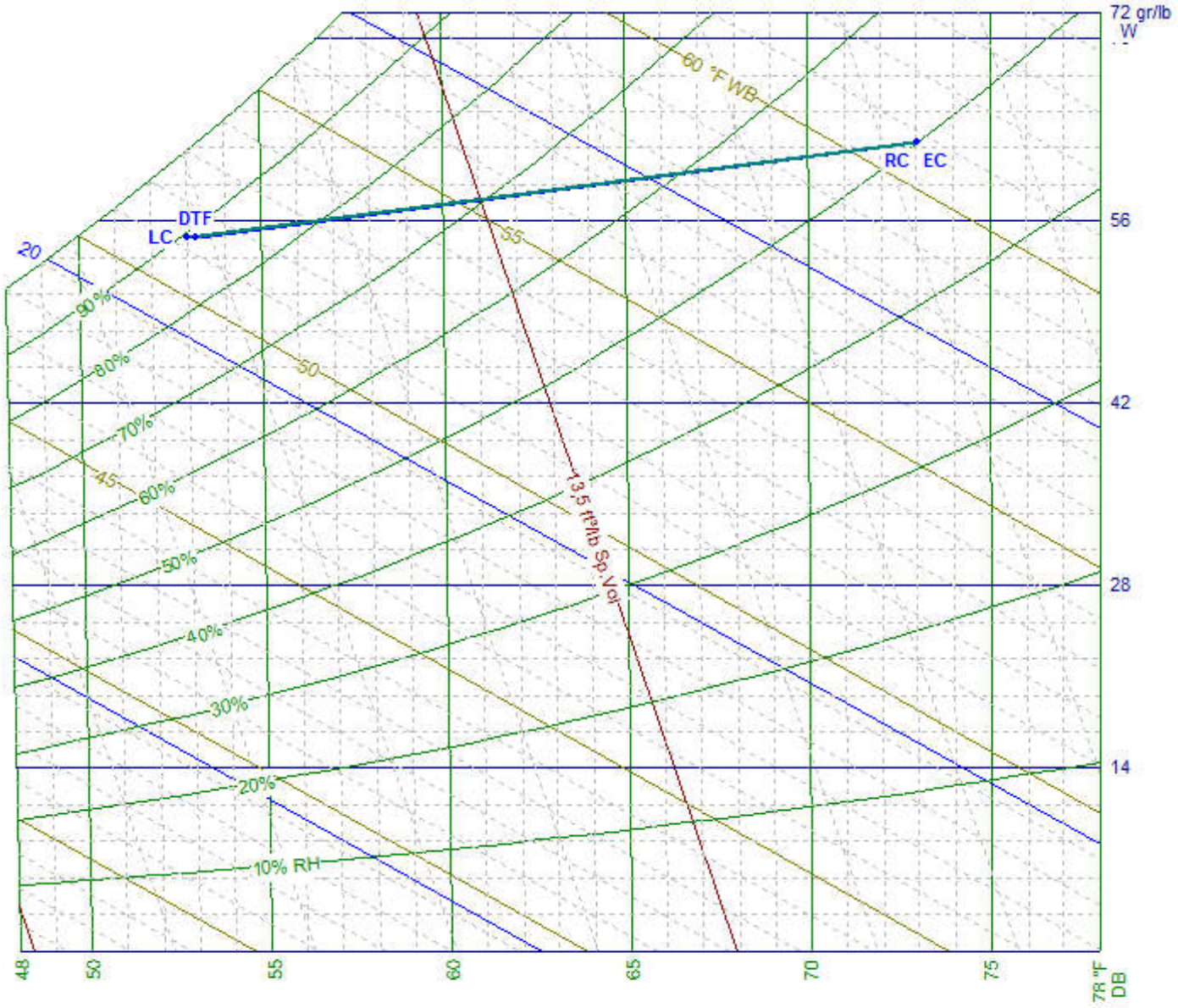
# *Air System #3 (Innovación) Psychrometric Chart*

| | | | |
|---|---|---|---|
| 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 |



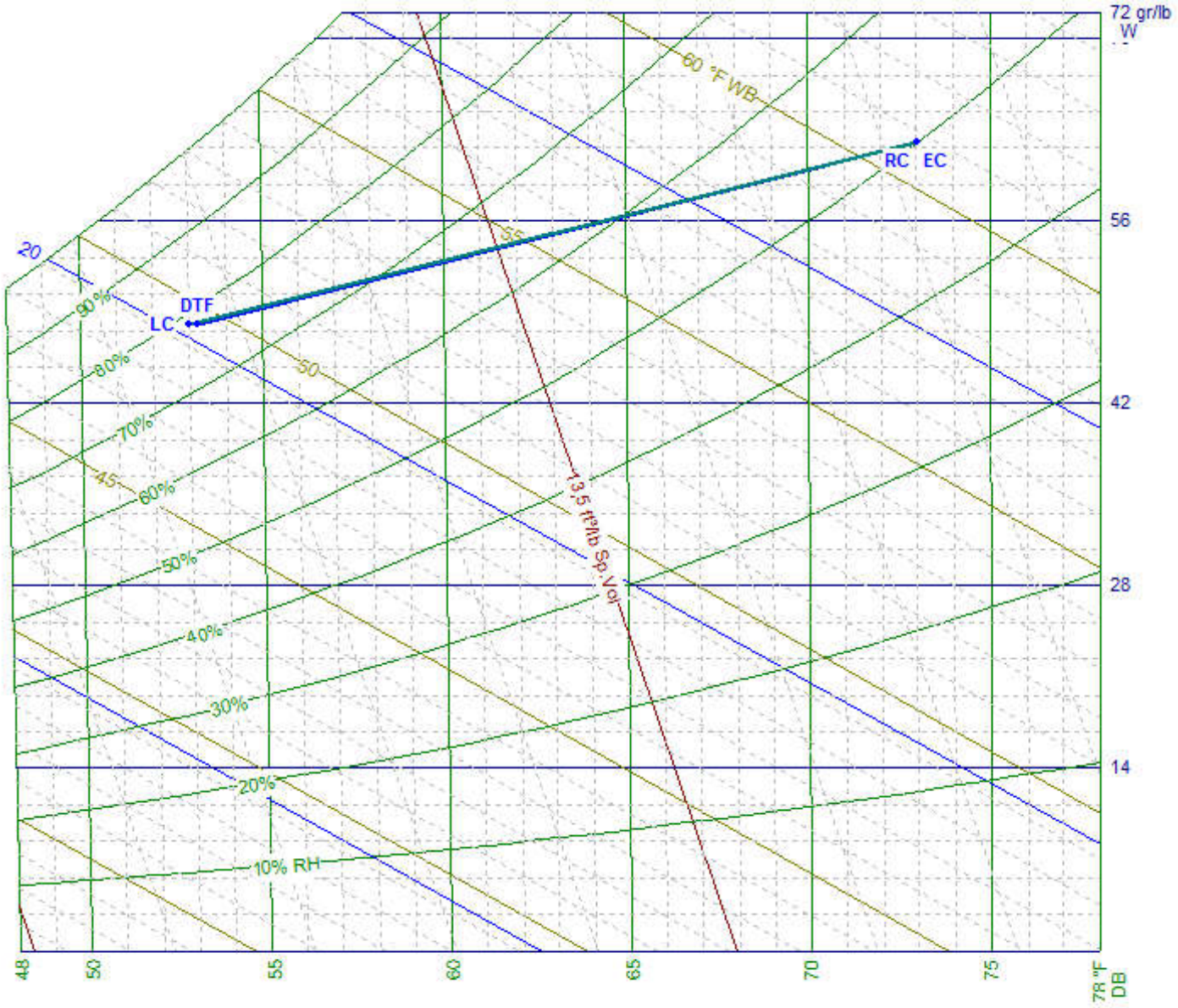
# *Air System #4 (Coordinación 1) Psychrometric Chart*

| | | | |
|---|---|---|---|
| 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 |



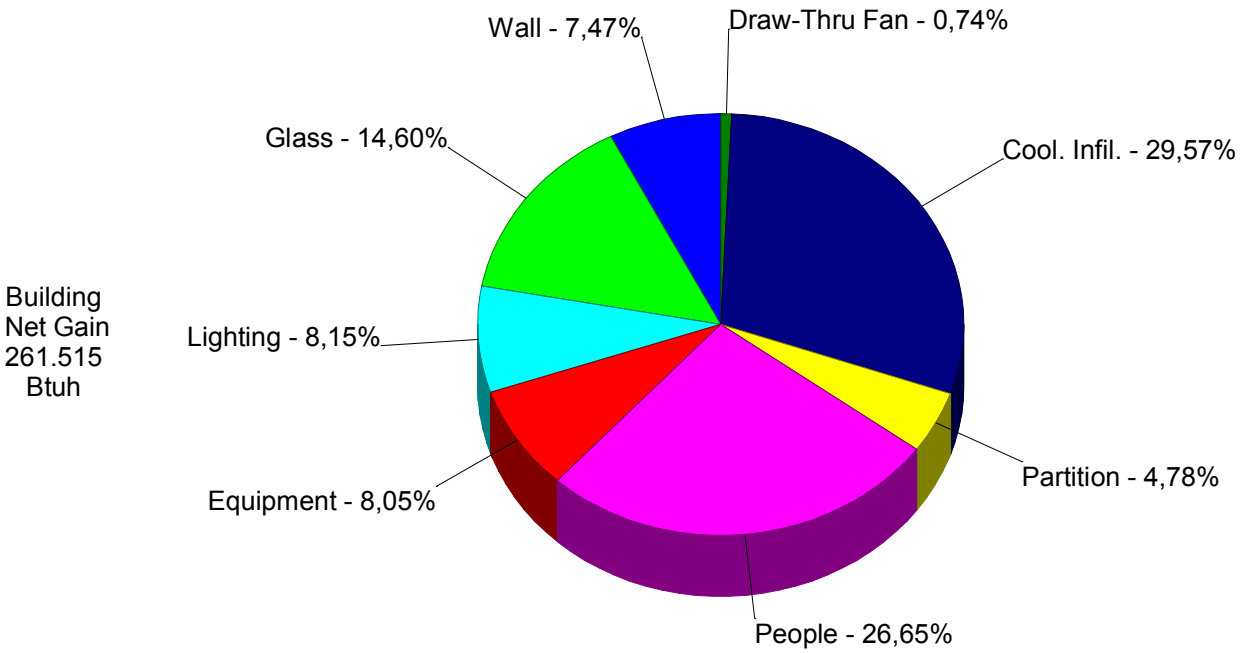
# *Air System #5 (Coordinación 2) Psychrometric Chart*

| | | | |
|---|---|---|---|
| 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 |



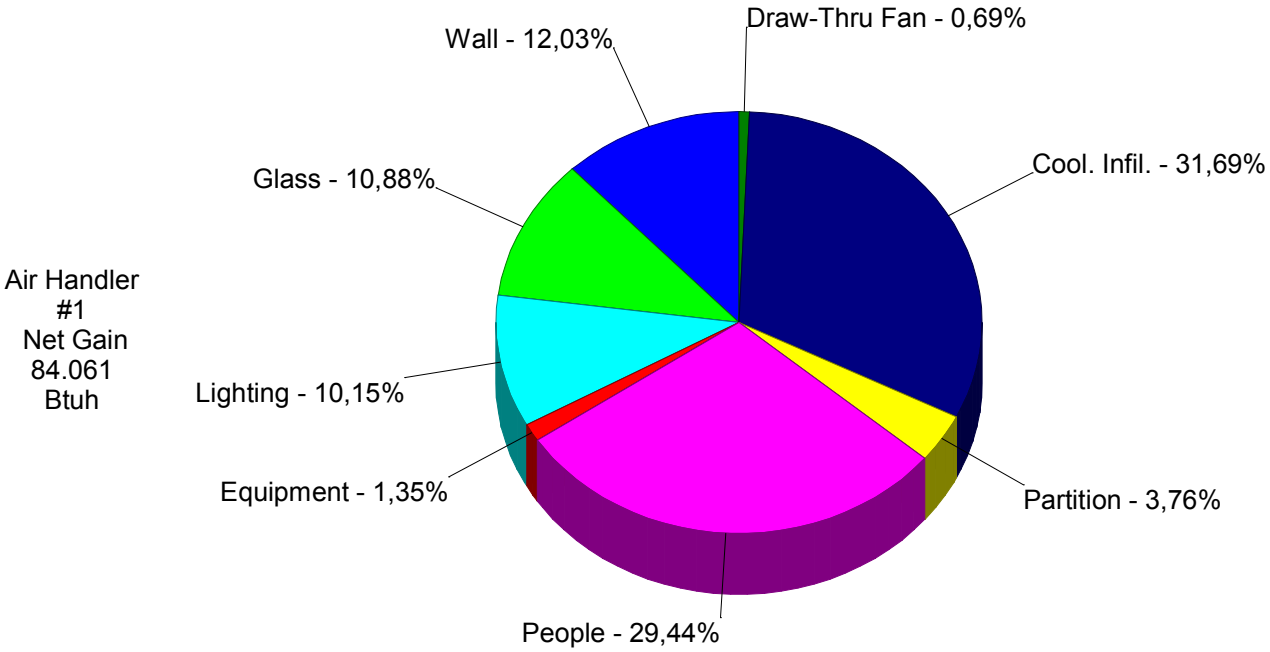
# Building Pie Charts

Building peaks in June at 4pm.



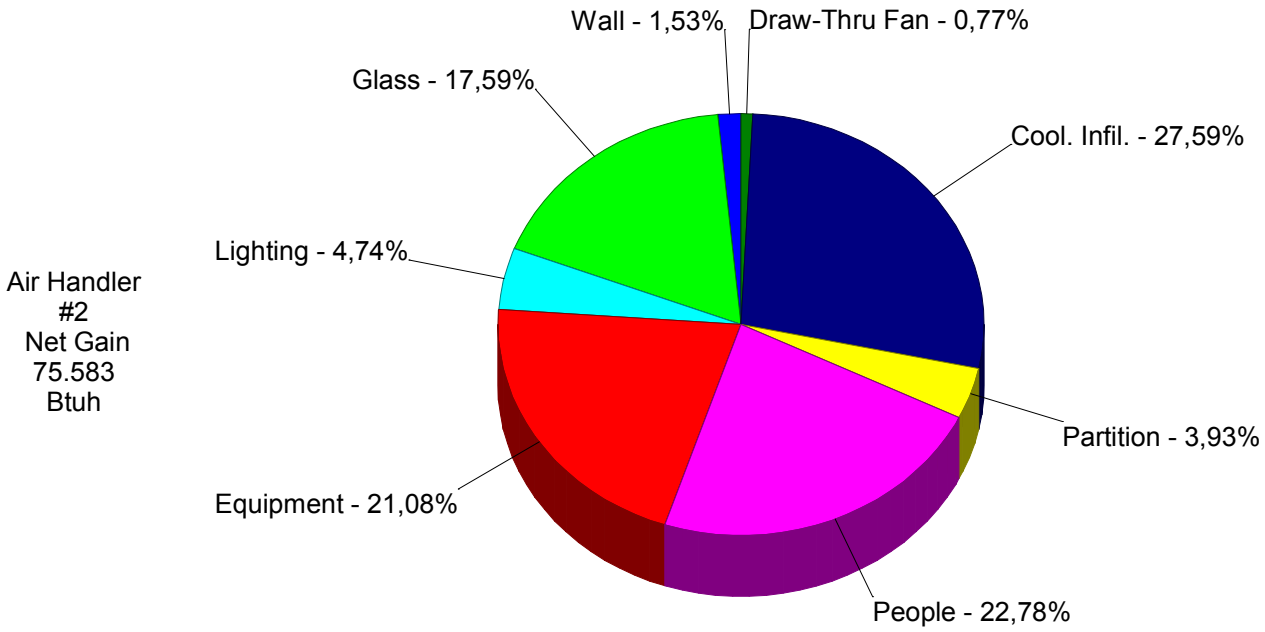
# *Air Handler #1 - UMA Sala de Arte - Pie Charts*

Air Handler #1 peaks in June at 2pm.



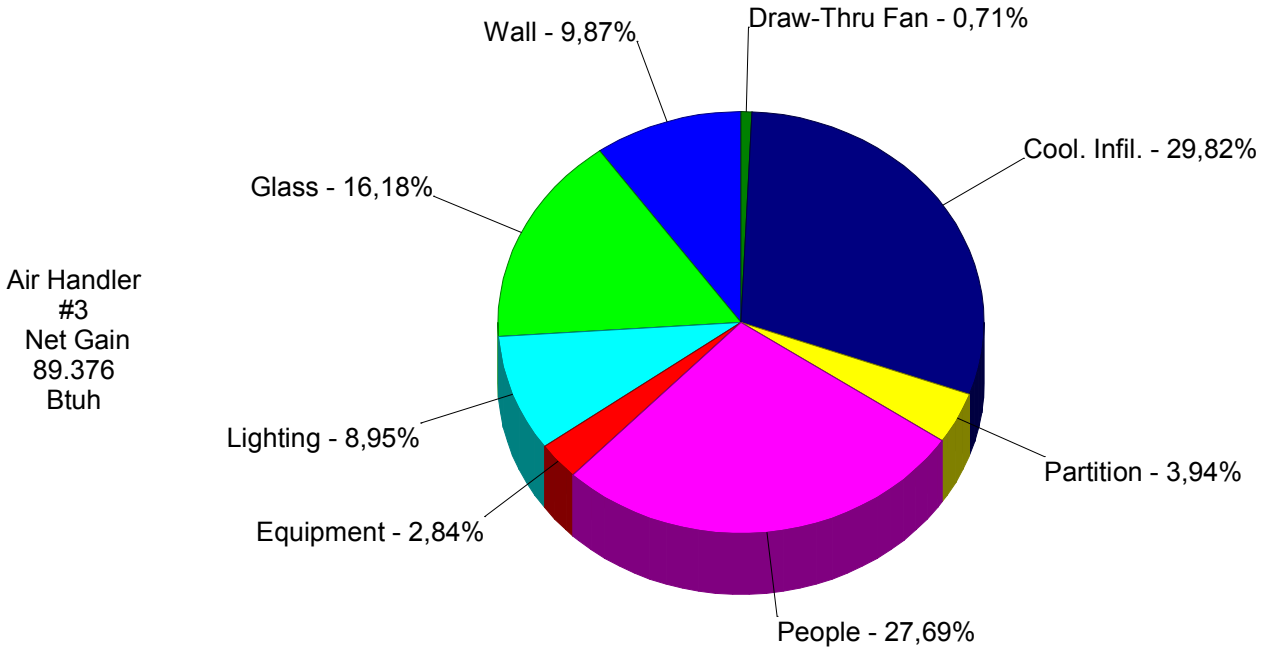
# *Air Handler #2 - UMA Informática - Pie Charts*

Air Handler #2 peaks in June at 2pm.



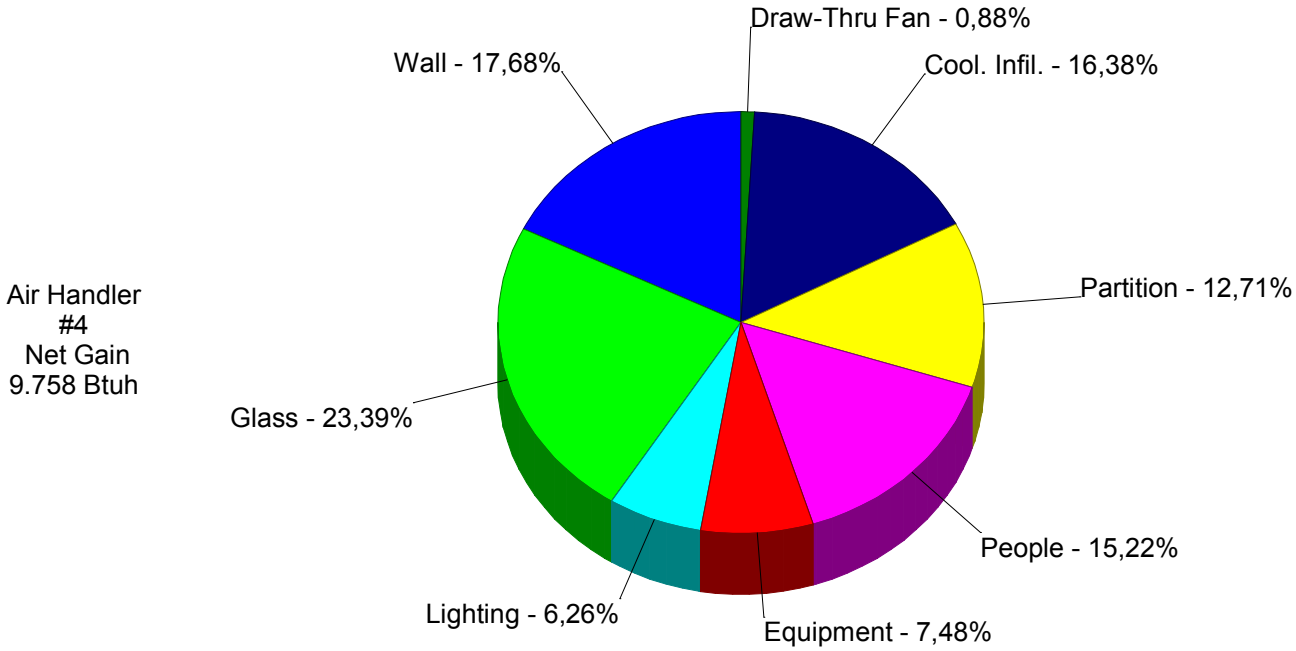
# *Air Handler #3 - Innovación - Pie Charts*

Air Handler #3 peaks in June at 5pm.



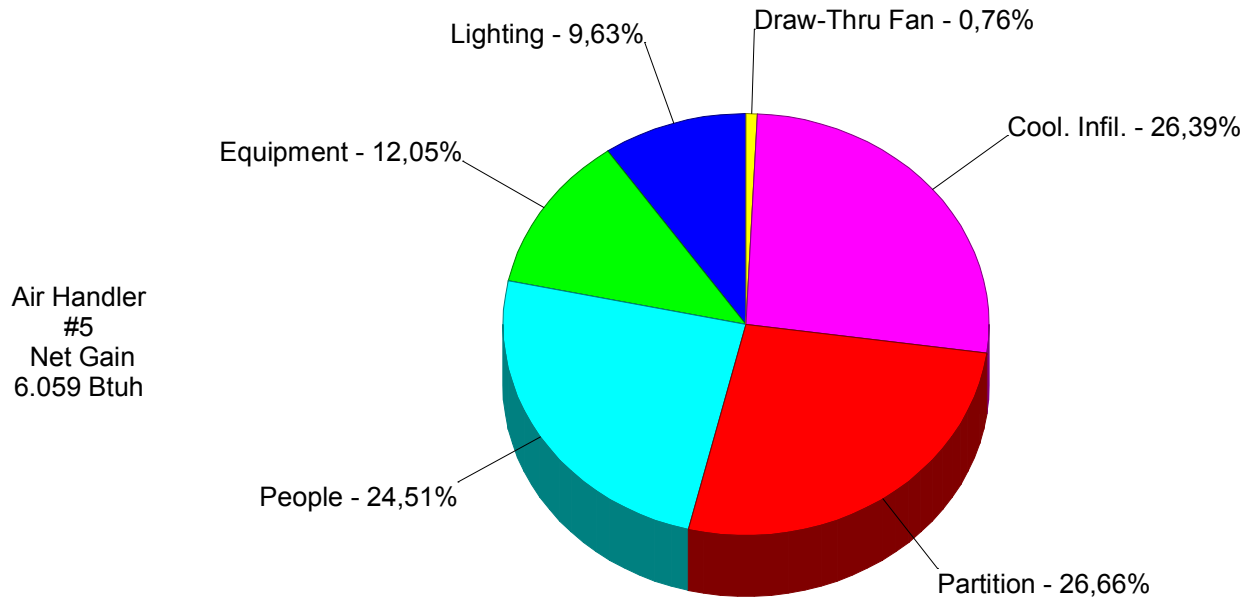
# *Air Handler #4 - Coordinación 1 - Pie Charts*

Air Handler #4 peaks in December at 4pm.



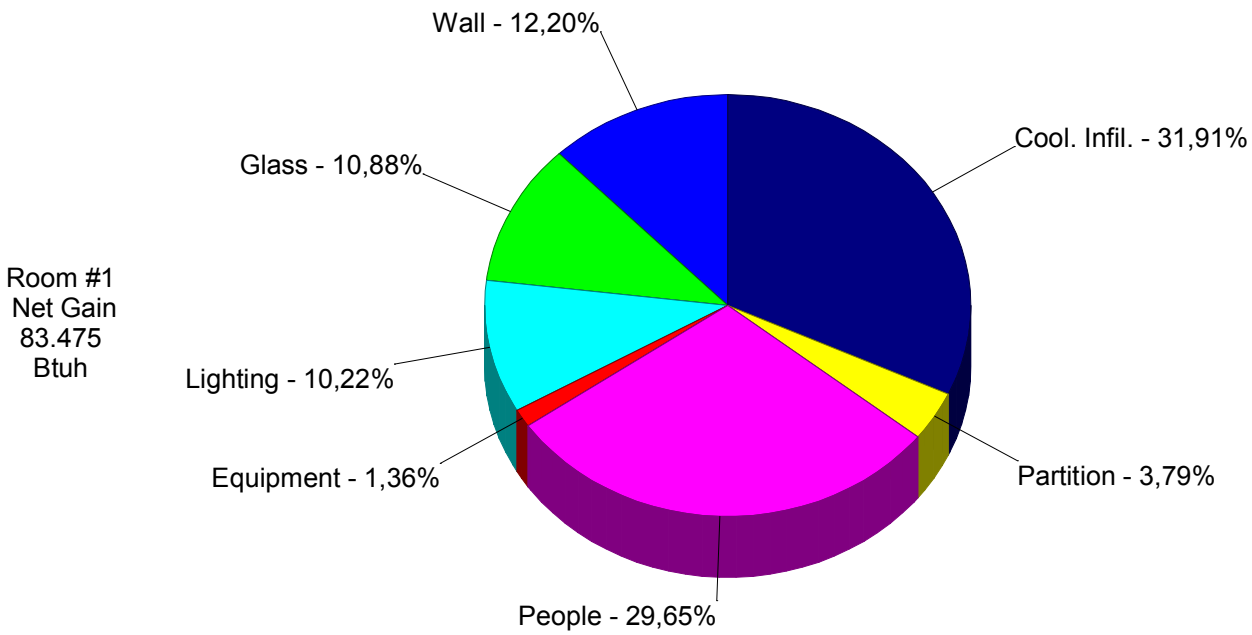
# *Air Handler #5 - Coordinación 2 - Pie Charts*

Air Handler #5 peaks in December at 1pm.



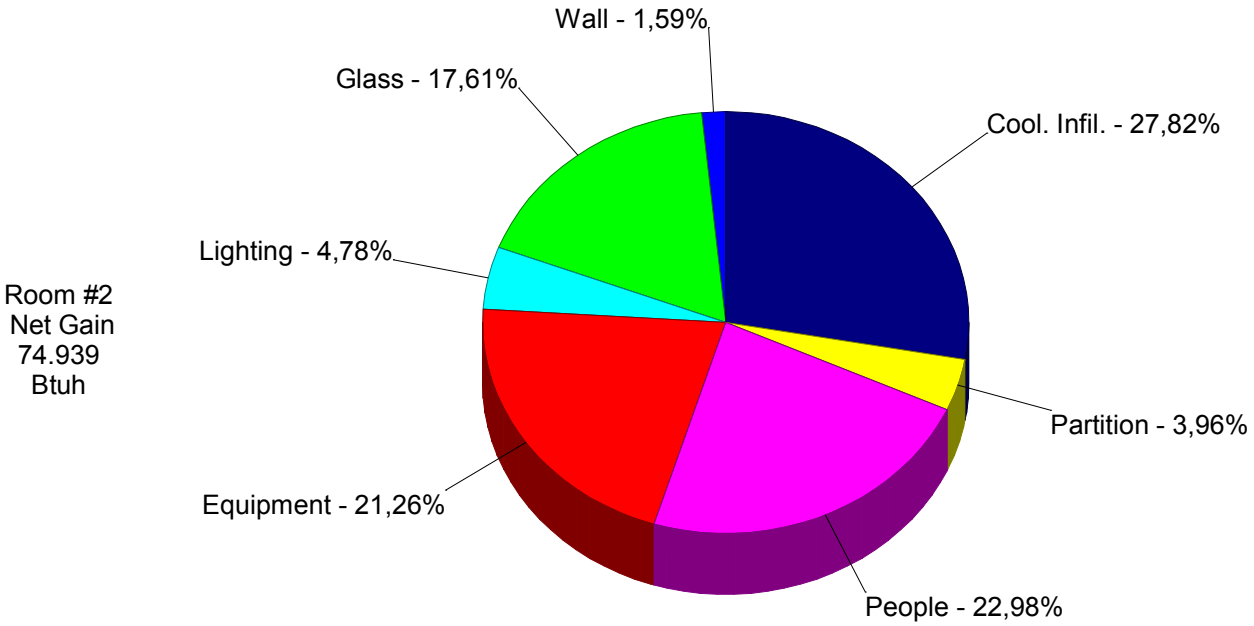
# *Room #1 - Sala de Arte - Pie Charts*

Room #1 peaks in June at 3pm



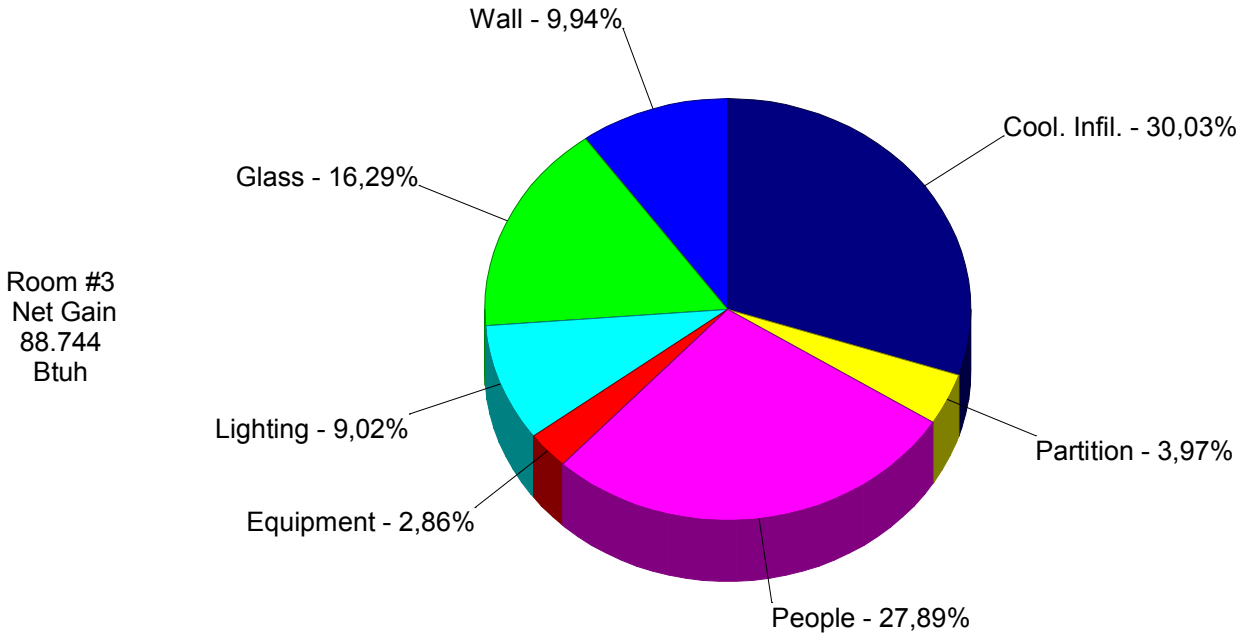
# *Room #2 - Informática - Pie Charts*

Room #2 peaks in June at 3pm



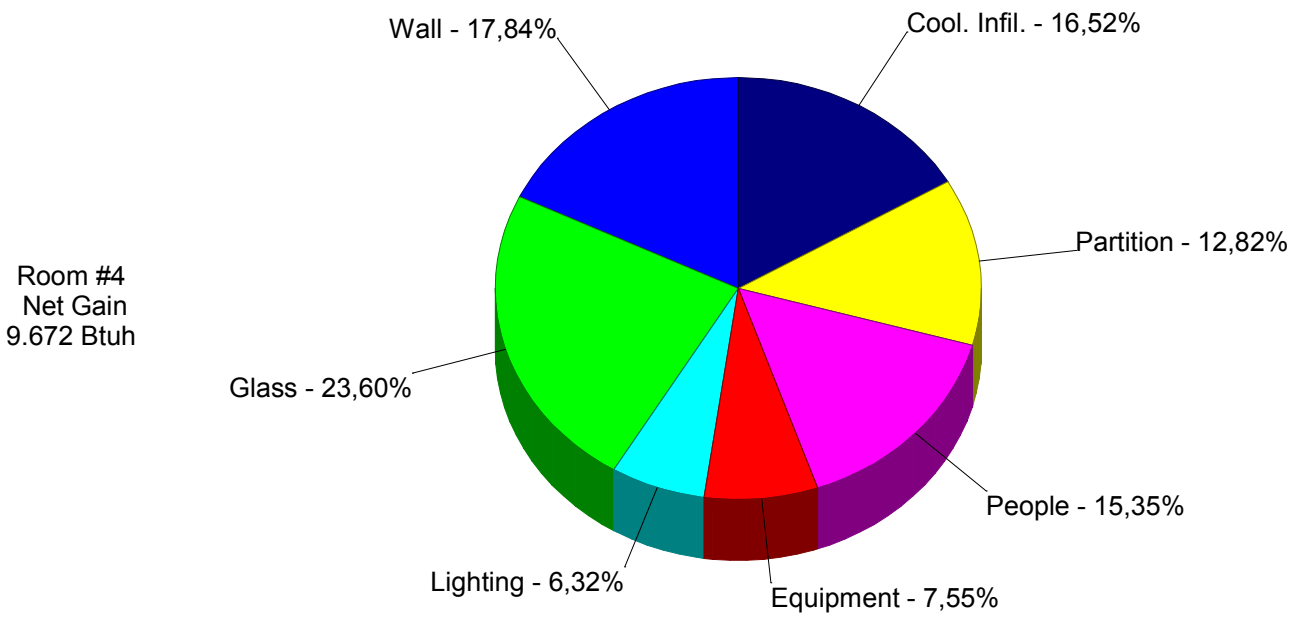
# *Room #3 - Innovación - Pie Charts*

Room #3 peaks in June at 5pm



# *Room #4 - Coordinación 1 - Pie Charts*

Room #4 peaks in December at 4pm



# *Room #5 - Coordinación 2 - Pie Charts*

Room #5 peaks in December at 3pm

