

## Air System Sizing Summary for UMA P1-01

Project Name: 20170721 - Centro de Salud El Coca  
Prepared by: Innovatec&solutions

07/25/2017  
04:23

### Air System Information

Air System Name ..... **UMA P1-01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **1FDDVAV**

Number of zones ..... **3**  
Floor Area ..... **1344.6** ft²  
Location ..... **El Coca, Ecuador**

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... **Peak zone sensible load**  
Space CFM ..... **Coincident space loads**

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **User-Modified**

### Central Cooling Coil Sizing Data

Total coil load ..... **7.1** Tons  
Total coil load ..... **85.4** MBH  
Sensible coil load ..... **49.2** MBH  
Coil CFM at Feb 0700 ..... **2222** CFM  
Max block CFM ..... **2400** CFM  
Sum of peak zone CFM ..... **2400** CFM  
Sensible heat ratio ..... **0.576**  
ft²/Ton ..... **188.9**  
BTU/(hr-ft²) ..... **63.5**  
Water flow @ 10.0 °F rise ..... **N/A**

Load occurs at ..... **Feb 0700**  
OA DB / WB ..... **80.6 / 79.1** °F  
Entering DB / WB ..... **77.2 / 68.0** °F  
Leaving DB / WB ..... **56.1 / 55.4** °F  
Coil ADP ..... **53.8** °F  
Bypass Factor ..... **0.100**  
Resulting RH ..... **54** %  
Design supply temp. .... **55.0** °F  
Zone T-stat Check ..... **3 of 3** OK  
Max zone temperature deviation ..... **0.0** °F

### Central Heating Coil Sizing Data

**No central heating coil loads occurred during this calculation.**

### Preheat Coil Sizing Data

**No heating coil loads occurred during this calculation.**

### Supply Fan Sizing Data

Actual max CFM ..... **2400** CFM  
Standard CFM ..... **2331** CFM  
Actual max CFM/ft² ..... **1.78** CFM/ft²

Fan motor BHP ..... **0.00** BHP  
Fan motor kW ..... **0.00** kW  
Fan static ..... **0.00** in wg

### Outdoor Ventilation Air Data

Design airflow CFM ..... **492** CFM  
CFM/ft² ..... **0.37** CFM/ft²

CFM/person ..... **24.60** CFM/person

## Zone Sizing Summary for UMA P1-01

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### Air System Information

Air System Name ..... **UMA P1-01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **1FDDVAV**

Number of zones ..... **3**  
Floor Area ..... **1344.6** ft<sup>2</sup>  
Location ..... **El Coca, Ecuador**

### Sizing Calculation Information

#### Zone and Space Sizing Method:

Zone CFM ..... **Peak zone sensible load**  
Space CFM ..... **Coincident space loads**

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **User-Modified**

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft <sup>2</sup> )	Zone CFM/ft <sup>2</sup>
Zone 1	6.2	300	42	Feb 0700	0.0	115.1	2.61
Zone 2	9.9	500	83	Feb 0700	0.0	227.8	2.19
Zone 3	32.8	1600	367	Mar 0600	0.0	1001.7	1.60

### Zone Terminal Sizing Data

No Zone Terminal Sizing Data required for this system.

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft <sup>2</sup> )	Space CFM/ft <sup>2</sup>
<b>Zone 1</b>							
P1 08 Toma Muestra Espe	1	6.2	Feb 0700	300	0.0	115.1	2.61
<b>Zone 2</b>							
P1 09 Toma Muestras	1	9.9	Feb 0700	500	0.0	227.8	2.19
<b>Zone 3</b>							
P1 10 Laboraorio	1	32.8	Mar 0600	1600	0.0	1001.7	1.60

## Air System Design Load Summary for UMA P1-01

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Feb 0700 COOLING OA DB / WB 80.6 °F / 79.1 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 73.0 °F / 65.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	34 ft²	303	-	34 ft²	-	-
Wall Transmission	381 ft²	3183	-	381 ft²	0	-
Roof Transmission	1345 ft²	23798	-	1345 ft²	0	-
Window Transmission	34 ft²	204	-	34 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	0 ft²	0	-	0 ft²	0	-
Partitions	0 ft²	0	-	0 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1200 W	4094	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	1600 W	5459	-	0	0	-
People	20	5900	9100	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	5500	3500	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	48442	12600	-	0	0
Zone Conditioning	-	47179	12600	-	251	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2222 CFM	0	-	492 CFM	0	-
Ventilation Load	456 CFM	2046	23574	101 CFM	-276	0
Supply Fan Load	2222 CFM	0	-	492 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	49225	36174	-	-26	0
Central Cooling Coil	-	49225	36183	-	0	0
Central Heating Coil	-	0	-	-	0	-
Preheat Coil	-	0	-	-	0	-
>> Total Conditioning	-	49225	36183	-	0	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## System Psychrometrics for UMA P1-01

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**February DESIGN COOLING DAY, 0700**

**TABLE 1: SYSTEM DATA**

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	80.6	0.02189	456	400	2046	23574
Vent - Return Mixing	Outlet	77.2	0.01296	2222	1060	-	-
Preheat Coil	Outlet	77.2	0.01296	2222	1060	0	-
Supply Fan	Outlet	77.2	0.01296	2222	1060	0	-
Central Cooling Coil	Outlet	56.1	0.00943	2222	1060	49225	36183
Central Heating Coil	Outlet	77.2	0.01296	0	1060	0	-
Cold Supply Duct	Outlet	56.1	0.00943	2222	1060	-	-
Hot Supply Duct	Outlet	77.2	0.00943	0	1060	0	-
Zone Air	-	76.3	0.01066	2222	1230	47179	12600
Return Plenum	Outlet	76.3	0.01066	2222	1230	0	-

*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.049 BTU/(hr-CFM-F)*

*Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4611.0 BTU/(hr-CFM)*

*Site Altitude = 800.0 ft*

**TABLE 2: ZONE DATA**

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	6174	Cooling	6105	76.4	287	1190	0	0
Zone 2	9939	Cooling	9792	76.4	461	1397	0	0
Zone 3	32329	Cooling	31282	76.3	1474	1186	0	0

## System Psychrometrics for UMA P1-01

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### WINTER DESIGN HEATING

**TABLE 1: SYSTEM DATA**

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	73.0	0.01175	101	400	276	0
Vent - Return Mixing	Outlet	70.9	0.01175	492	432	-	-
Preheat Coil	Outlet	70.9	0.01175	492	432	0	-
Supply Fan	Outlet	70.9	0.01175	492	432	0	-
Central Cooling Coil	Outlet	70.9	0.01175	492	432	0	0
Central Heating Coil	Outlet	70.9	0.01175	0	432	0	-
Cold Supply Duct	Outlet	70.9	0.01175	492	432	-	-
Hot Supply Duct	Outlet	70.9	0.01175	0	432	0	-
Zone Air	-	70.4	0.01175	492	440	-251	0
Return Plenum	Outlet	70.4	0.01175	492	440	0	-

*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.049 BTU/(hr-CFM-F)*

*Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4611.0 BTU/(hr-CFM)*

*Site Altitude = 800.0 ft*

**TABLE 2: ZONE DATA**

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	0	Deadband	-19	70.4	42	440	0	0
Zone 2	0	Deadband	-37	70.4	83	440	0	0
Zone 3	0	Deadband	-194	70.4	367	440	0	0

## Psychrometric Analysis for UMA P1-01

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Location: El Coca, Ecuador

Altitude: 800.0 ft.

Data for: February DESIGN COOLING DAY, 0700

