

Air System Sizing Summary for UMA P1-02

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

07/25/2017
02:01

Air System Information

Air System Name **UMA P1-02**
Equipment Class **SPLT AHU**
Air System Type **1FDDVAV**

Number of zones **9**
Floor Area **2403.7** 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 **14.3** Tons
Total coil load **171.0** MBH
Sensible coil load **105.2** MBH
Coil CFM at Feb 0600 **4441** CFM
Max block CFM **4860** CFM
Sum of peak zone CFM **4860** CFM
Sensible heat ratio **0.615**
ft²/Ton **168.7**
BTU/(hr-ft²) **71.2**
Water flow @ 10.0 °F rise **N/A**

Load occurs at **Feb 0600**
OA DB / WB **80.0 / 79.0** °F
Entering DB / WB **77.9 / 67.3** °F
Leaving DB / WB **55.3 / 54.5** °F
Coil ADP **52.8** °F
Bypass Factor **0.100**
Resulting RH **48** %
Design supply temp. **55.0** °F
Zone T-stat Check **9 of 9** 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 **4860** CFM
Standard CFM **4721** CFM
Actual max CFM/ft² **2.02** 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 **1042** CFM
CFM/ft² **0.43** CFM/ft²

CFM/person **32.56** CFM/person

Zone Sizing Summary for UMA P1-02

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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 ²)	Zone CFM/ft ²
Zone 1	18.9	806	202	Mar 0600	0.0	551.3	1.46
Zone 2	13.1	550	95	Apr 0600	0.0	260.1	2.11
Zone 3	19.4	830	252	Feb 0700	0.0	688.7	1.21
Zone 4	6.6	255	35	Dec 0100	0.0	96.6	2.64
Zone 5	6.4	255	41	Dec 0200	0.0	111.1	2.30
Zone 6	9.3	350	65	Jan 0100	0.0	177.5	1.97
Zone 7	4.8	180	26	Mar 0100	0.0	72.2	2.49
Zone 8	14.7	817	163	Feb 0600	0.0	223.1	3.66
Zone 9	17.5	817	163	Apr 0600	0.0	223.1	3.66

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 ²)	Space CFM/ft ²
Zone 1							
P1 27 Recup Partos	1	18.9	Mar 0600	806	0.0	551.3	1.46
Zone 2							
P1 28 Labor	1	13.1	Apr 0600	550	0.0	260.1	2.11
Zone 3							
P1 29 Corredor Obst	1	19.4	Feb 0700	830	0.0	688.7	1.21
Zone 4							
P1 30 Lactario	1	6.6	Dec 0100	255	0.0	96.6	2.64
Zone 5							
P1 31 Limpieza Neonat	1	6.4	Dec 0200	255	0.0	111.1	2.30
Zone 6							
P1 32 Esterilizacion	1	9.3	Jan 0100	350	0.0	177.5	1.97
Zone 7							
P1 33 Uteria Limp	1	4.8	Mar 0100	180	0.0	72.2	2.49
Zone 8							
P1 34 Sala Partos 1	1	14.7	Feb 0600	817	0.0	223.1	3.66
Zone 9							
P1 35 Sala Partos 2	1	17.5	Apr 0600	817	0.0	223.1	3.66

Air System Design Load Summary for UMA P1-02

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Feb 0600 COOLING OA DB / WB 80.0 °F / 79.0 °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	84 ft²	1193	-	84 ft²	-	-
Wall Transmission	1360 ft²	11092	-	1360 ft²	0	-
Roof Transmission	2404 ft²	41067	-	2404 ft²	0	-
Window Transmission	84 ft²	409	-	84 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	3100 W	10577	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	7000 W	23884	-	0	0	-
People	32	9135	11265	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	8000	5100	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	105357	16365	-	0	0
Zone Conditioning	-	102696	16365	-	1789	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	4441 CFM	0	-	1042 CFM	0	-
Ventilation Load	894 CFM	2464	49499	1042 CFM	-1789	0
Supply Fan Load	4441 CFM	0	-	1042 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	105160	65864	-	0	0
Central Cooling Coil	-	105160	65868	-	0	0
Central Heating Coil	-	0	-	-	0	-
Preheat Coil	-	0	-	-	0	-
>> Total Conditioning	-	105160	65868	-	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 P1-02

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February DESIGN COOLING DAY, 0600

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	80.0	0.02189	894	400	2464	49499
Vent - Return Mixing	Outlet	77.9	0.01229	4441	851	-	-
Preheat Coil	Outlet	77.9	0.01229	4441	851	0	-
Supply Fan	Outlet	77.9	0.01229	4441	851	0	-
Central Cooling Coil	Outlet	55.3	0.00908	4441	851	105160	65868
Central Heating Coil	Outlet	77.9	0.01229	0	851	0	-
Cold Supply Duct	Outlet	55.3	0.00908	4441	851	-	-
Hot Supply Duct	Outlet	77.9	0.00908	0	851	0	-
Zone Air	-	77.3	0.00988	4441	965	102696	16365
Return Plenum	Outlet	77.3	0.00988	4441	965	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	18664	Cooling	18014	77.4	776	956	0	0
Zone 2	12629	Cooling	12329	77.4	531	980	0	0
Zone 3	19177	Cooling	18437	77.4	795	968	0	0
Zone 4	5911	Cooling	5802	77.5	250	1019	0	0
Zone 5	5879	Cooling	5758	77.4	248	961	0	0
Zone 6	7925	Cooling	7714	77.4	333	870	0	0
Zone 7	3809	Cooling	3726	77.3	161	842	0	0
Zone 8	14696	Cooling	14544	77.1	637	999	0	0
Zone 9	16667	Cooling	16372	77.2	711	983	0	0

System Psychrometrics for UMA P1-02

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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	1042	400	1789	0
Vent - Return Mixing	Outlet	73.0	0.01175	1042	400	-	-
Preheat Coil	Outlet	73.0	0.01175	1042	400	0	-
Supply Fan	Outlet	73.0	0.01175	1042	400	0	-
Central Cooling Coil	Outlet	73.0	0.01175	1042	400	0	0
Central Heating Coil	Outlet	73.0	0.01175	0	400	0	-
Cold Supply Duct	Outlet	73.0	0.01175	1042	400	-	-
Hot Supply Duct	Outlet	73.0	0.01175	0	400	0	-
Zone Air	-	71.4	0.01175	1042	400	-1789	0
Return Plenum	Outlet	71.4	0.01175	1042	400	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	-358	71.3	202	400	0	0
Zone 2	0	Deadband	-181	71.2	95	400	0	0
Zone 3	0	Deadband	-388	71.5	252	400	0	0
Zone 4	0	Deadband	-73	71.0	35	400	0	0
Zone 5	0	Deadband	-83	71.1	41	400	0	0
Zone 6	0	Deadband	-146	70.9	65	400	0	0
Zone 7	0	Deadband	-60	70.8	26	400	0	0
Zone 8	0	Deadband	-216	71.7	163	400	0	0
Zone 9	0	Deadband	-284	71.3	163	400	0	0

Psychrometric Analysis for UMA P1-02

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Location: El Coca, Ecuador

Altitude: 800.0 ft.

Data for: February DESIGN COOLING DAY, 0600

