Air System Sizing Summary for P2 QUIROFANO-02

Project Name: UMI SAN RAFAEL TUNJA — 06/13/2024
Prepared by: TERMICA — 02:06p. m.

Air System Information

Air System Name	**P2 QUIROFANO-02**	Number of zones	**1**	
Equipment Class	**SPLT AHU**	Floor Area	**227.0**	ft²
Air System Type	**SZCAV**	Location	**Tunja, Colombia**	

Sizing Calculation Information

Calculation Months	**Jan to Dec**	Zone CFM Sizing	**Sum of space airflow rates**
Sizing Data	**Calculated**	Space CFM Sizing	**Individual peak space loads**

Central Cooling Coil Sizing Data

Total coil load	**1.9**	Tons	Load occurs at	**Jun 1500**	
Total coil load	**22.6**	MBH	OA DB / WB	**63.4 / 56.0**	°F
Sensible coil load	**20.2**	MBH	Entering DB / WB	**69.3 / 56.9**	°F
Coil CFM at Jun 1500	**1484**	CFM	Leaving DB / WB	**51.5 / 50.4**	°F
Max block CFM	**1484**	CFM	Coil ADP	**49.6**	°F
Sum of peak zone CFM	**1484**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.895**		Resulting RH	**50**	%
CFM/Ton	**788.4**		Design supply temp.	**54.0**	°F
ft²/Ton	**120.6**		Zone T-stat Check	**1 of 1**	OK
BTU/(hr·ft²)	**99.5**		Max zone temperature deviation	**0.0**	°F
Water flow @ 10.0 °F rise	**N/A**				

Central Heating Coil Sizing Data

Max coil load	**4.4**	MBH	Load occurs at	**Jan 2100**	
Coil CFM at Jan 2100	**1484**	CFM	BTU/(hr·ft²)	**19.2**	
Max coil CFM	**1484**	CFM	Ent. DB / Lvg DB	**51.0 / 54.8**	°F
Water flow @ 20.0 °F drop	**N/A**				

Supply Fan Sizing Data

Actual max CFM	**1484**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**1056**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**6.54**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**186**	CFM	CFM/person	**26.57**	CFM/person
CFM/ft²	**0.82**	CFM/ft²			

Zone Sizing Summary for P2 QUIROFANO-02

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Air System Information

Air System Name **P2 QUIROFANO-02**
Equipment Class ..... **SPLT AHU**
Air System Type ..... **SZCAV**

Number of zones **1**
Floor Area ..... **227.0** ft²
Location ..... **Tunja, Colombia**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	1484	1484	6.54	0.0	-	0.0	-	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft²)
Zone 1	18.3	Jun 1500	1.5	227.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft²)	Space CFM/ft²
Zone 1							
P2 QUIROFANO 2	1	18.3	Jun 1500	1484	1.5	227.0	6.54

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 63.4 °F / 56.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 36.0 °F / 29.2 °F		
ZONE LOADS	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**	**Details**	**Sensible (BTU/hr)**	**Latent (BTU/hr)**
Window & Skylight Solar Loads	18 ft²	680	-	18 ft²	-	-
Wall Transmission	106 ft²	-171	-	106 ft²	950	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	18 ft²	-189	-	18 ft²	558	-
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	681 W	2324	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4000 W	13648	-	0	0	-
People	7	1960	1890	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**18252**	**1890**	**-**	**1508**	**0**
Zone Conditioning	-	18364	1890	-	-113	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	1484 CFM	0	-	1484 CFM	0	-
Ventilation Load	186 CFM	-958	476	186 CFM	151	0
Supply Fan Load	1484 CFM	0	-	1484 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**17406**	**2366**	**-**	**38**	**0**
Central Cooling Coil	-	20214	2366	-	0	0
Central Heating Coil	-	-2808	-	-	0	-
>> Total Conditioning	**-**	**17406**	**2366**	**-**	**0**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

Zone Design Load Summary for P2 QUIROFANO-02

Project Name: UMI SAN RAFAEL TUNJA 06/13/2024
Prepared by: TERMICA 02:06p. m.

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 63.4 °F / 56.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 36.0 °F / 29.2 °F		
	OCCUPIED T-STAT 70.0 °F			OCCUPIED T-STAT 65.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	18 ft²	680	-	18 ft²	-	-
Wall Transmission	106 ft²	-171	-	106 ft²	950	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	18 ft²	-189	-	18 ft²	558	-
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	681 W	2324	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4000 W	13648	-	0	0	-
People	7	1960	1890	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**18252**	**1890**	**-**	**1508**	**0**

TABLE 1.1.A. Component Loads For Space "P2 QUIROFANO 2" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 63.4 °F / 56.0 °F OCCUPIED T-STAT 70.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 36.0 °F / 29.2 °F OCCUPIED T-STAT 65.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	**Details**	**(BTU/hr)**	**(BTU/hr)**	**Details**	**(BTU/hr)**	**(BTU/hr)**
Window & Skylight Solar Loads	18 ft²	680	-	18 ft²	-	-
Wall Transmission	106 ft²	-171	-	106 ft²	950	-
Roof Transmission	0 ft²	0	-	0 ft²	0	-
Window Transmission	18 ft²	-189	-	18 ft²	558	-
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	681 W	2324	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4000 W	13648	-	0	0	-
People	7	1960	1890	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	**-**	**18252**	**1890**	**-**	**1508**	**0**

TABLE 1.1.B. Envelope Loads For Space "P2 QUIROFANO 2" In Zone "Zone 1"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(ft²)	(BTU/(hr·ft²·°F))	Coeff.	(BTU/hr)	(BTU/hr)	(BTU/hr)
NNE EXPOSURE						
WALL	106	0.309	-	-171	-	950
WINDOW 1	18	1.093	0.733	-189	680	558

June DESIGN COOLING DAY, 1500

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	63.4	0.01178	186	400	-958	476
Vent - Return Mixing	Outlet	69.3	0.01111	1484	819	-	-
Central Cooling Coil	Outlet	51.5	0.01064	1484	819	20214	2366
Central Heating Coil	Outlet	54.0	0.01064	1484	819	2808	-
Supply Fan	Outlet	54.0	0.01064	1484	819	0	-
Cold Supply Duct	Outlet	54.0	0.01064	1484	819	-	-
Zone Air	-	70.1	0.01102	1484	880	18364	1890
Return Plenum	Outlet	70.1	0.01102	1484	880	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 0.769 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 3379.3 BTU/(hr-CFM)
Site Altitude = 9104.3 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	18252	Cooling	18364	70.1	1484	880	0	0

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	36.0	0.00314	186	400	-151	0
Vent - Return Mixing	Outlet	36.9	0.00314	1484	461	-	-
Central Cooling Coil	Outlet	36.9	0.00314	1484	461	0	0
Central Heating Coil	Outlet	36.9	0.00314	1484	461	0	-
Supply Fan	Outlet	36.9	0.00314	1484	461	0	-
Cold Supply Duct	Outlet	37.0	0.00314	1484	461	-	-
Zone Air	-	37.1	0.00314	1484	470	113	0
Return Plenum	Outlet	37.1	0.00314	1484	470	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 0.769 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 3379.3 BTU/(hr-CFM)
Site Altitude = 9104.3 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	-1508	Deadband	113	37.1	1484	470	0	0