

Air System Sizing Summary for HVAC

Project Name: 70_Alfaro01
Prepared by: Mega Marketplace

06/20/2024
10:25PM

Air System Information

Air System Name HVAC
Equipment Class PKG ROOF
Air System Type SZCAV

Number of zones 1
Floor Area 1584.5 ft²
Location Dallas, Texas

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

Central Cooling Coil Sizing Data

Total coil load 12.2 Tons
Total coil load 146.4 MBH
Sensible coil load 127.7 MBH
Coil CFM at Jul 1500 5533 CFM
Max block CFM 5533 CFM
Sum of peak zone CFM 5533 CFM
Sensible heat ratio 0.872
CFM/Ton 453.6
ft²/Ton 129.9
BTU/(hr-ft²) 92.4
Water flow @ 10.0 °F rise N/A

Load occurs at Jul 1500
OA DB / WB 100.0 / 74.0 °F
Entering DB / WB 78.5 / 64.1 °F
Leaving DB / WB 56.7 / 55.1 °F
Coil ADP 53.7 °F
Bypass Factor 0.120
Resulting RH 48 %
Design supply temp. 55.0 °F
Zone T-stat Check 1 of 1 OK
Max zone temperature deviation 0.0 °F

Central Heating Coil Sizing Data

Max coil load 47.7 MBH
Coil CFM at Des Htg 5533 CFM
Max coil CFM 5533 CFM
Water flow @ 20.0 °F drop N/A

Load occurs at Des Htg
BTU/(hr-ft²) 30.1
Ent. DB / Lvg DB 64.3 / 72.5 °F

Supply Fan Sizing Data

Actual max CFM 5533 CFM
Standard CFM 5415 CFM
Actual max CFM/ft² 3.49 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 551 CFM
CFM/ft² 0.35 CFM/ft²

CFM/person 11.72 CFM/person

Zone Sizing Summary for HVAC

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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/ft ²	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	5533	5533	3.49	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 (ft ²)
Zone 1	116.1	Jul 1700	18.5	1584.5

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 (ft ²)	Space CFM/ft ²
Zone 1							
Back Kitchen	1	24.8	Aug 2300	1173	2.6	190.0	6.17
Dining Space	1	20.6	Jul 1600	974	7.8	924.0	1.05
Dry Storage	1	1.0	Jul 1600	45	0.9	30.0	1.51
Front Kitchen	1	45.3	Aug 2300	2144	2.7	280.0	7.66
Mech.	1	20.0	Aug 2300	946	1.3	38.5	24.57
Office	1	2.2	Jul 1700	103	0.9	30.0	3.44
Restroom-1	1	1.6	Jul 1600	74	1.1	46.0	1.60
Restroom-2	1	1.6	Jul 1600	74	1.1	46.0	1.60

Ventilation Sizing Summary for HVAC

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1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
Design Ventilation Airflow Rate **551** CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
Back Kitchen	1	190.0	3.0	1172.6	7.50	0.12	0.0	0.0	45.3
Dining Space	1	924.0	32.0	974.3	7.50	0.18	0.0	0.0	406.3
Dry Storage	1	30.0	1.0	45.2	7.50	0.12	0.0	0.0	11.1
Front Kitchen	1	280.0	5.0	2144.1	7.50	0.12	0.0	0.0	71.1
Mech.	1	38.5	1.0	946.1	0.00	0.00	0.0	0.0	0.0
Office	1	30.0	3.0	103.2	5.00	0.06	0.0	0.0	16.8
Restroom-1	1	46.0	1.0	73.8	0.00	0.00	0.0	0.0	0.0
Restroom-2	1	46.0	1.0	73.8	0.00	0.00	0.0	0.0	0.0
Totals (incl. Space Multipliers)				5533.2					550.6

Air System Design Load Summary for HVAC

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 100.0 °F / 74.0 °F			HEATING OA DB / WB 17.0 °F / 13.9 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	4378 ft²	4711	-	4378 ft²	11563	-
Roof Transmission	1585 ft²	4476	-	1585 ft²	3770	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	224 ft²	1286	-	224 ft²	3191	-
Floor Transmission	1585 ft²	0	-	1585 ft²	0	-
Partitions	2521 ft²	0	-	2521 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1585 W	4688	-	0	0	-
Task Lighting	1585 W	5007	-	0	0	-
Electric Equipment	21850 W	70132	-	0	0	-
People	47	9603	9635	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	720	930	-	0	0
Safety Factor	15% / 5%	15093	528	0%	0	0
>> Total Zone Loads	-	115716	11093	-	18523	0
Zone Conditioning	-	113800	11093	-	17140	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	5533 CFM	0	-	5533 CFM	0	-
Ventilation Load	551 CFM	13903	7592	551 CFM	30590	0
Supply Fan Load	5533 CFM	0	-	5533 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	127702	18685	-	47730	0
Central Cooling Coil	-	127702	18693	-	0	0
Central Heating Coil	-	0	-	-	47730	-
>> Total Conditioning	-	127702	18693	-	47730	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 HVAC

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 98.0 °F / 73.5 °F			HEATING OA DB / WB 17.0 °F / 13.9 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	0 ft²	0	-	0 ft²	-	-
Wall Transmission	4378 ft²	4882	-	4378 ft²	11563	-
Roof Transmission	1585 ft²	3728	-	1585 ft²	3770	-
Window Transmission	0 ft²	0	-	0 ft²	0	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	224 ft²	1230	-	224 ft²	3191	-
Floor Transmission	1585 ft²	0	-	1585 ft²	0	-
Partitions	2521 ft²	0	-	2521 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1585 W	4779	-	0	0	-
Task Lighting	1585 W	5058	-	0	0	-
Electric Equipment	21850 W	70693	-	0	0	-
People	47	9846	9635	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	720	930	-	0	0
Safety Factor	15% / 5%	15140	528	0%	0	0
>> Total Zone Loads	-	116076	11093	-	18523	0

System Psychrometrics for HVAC

Project Name: 70_Alfaro01
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July 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	100.0	0.01244	551	400	13903	7592
Vent - Return Mixing	Outlet	78.5	0.00977	5533	1234	-	-
Central Cooling Coil	Outlet	56.7	0.00904	5533	1234	127702	18693
Central Heating Coil	Outlet	56.7	0.00904	5533	1234	0	-
Supply Fan	Outlet	56.7	0.00904	5533	1234	0	-
Cold Supply Duct	Outlet	56.7	0.00904	5533	1234	-	-
Zone Air	-	76.1	0.00947	5533	1326	113800	11093
Return Plenum	Outlet	76.1	0.00947	5533	1326	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.057 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4645.1 BTU/(hr-CFM)

Site Altitude = 597.0 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	115716	Cooling	113800	76.1	5533	1326	0	0

System Psychrometrics for HVAC

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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	17.0	0.00094	551	400	-30590	0
Vent - Return Mixing	Outlet	64.3	0.00094	5533	483	-	-
Central Cooling Coil	Outlet	64.3	0.00094	5533	483	0	0
Central Heating Coil	Outlet	72.5	0.00094	5533	483	47730	-
Supply Fan	Outlet	72.5	0.00094	5533	483	0	-
Cold Supply Duct	Outlet	72.5	0.00094	5533	483	-	-
Zone Air	-	69.6	0.00094	5533	492	-17140	0
Return Plenum	Outlet	69.6	0.00094	5533	492	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.057 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4645.1 BTU/(hr-CFM)

Site Altitude = 597.0 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	-18523	Heating	-17140	69.6	5533	492	0	0

System Psychrometrics for HVAC

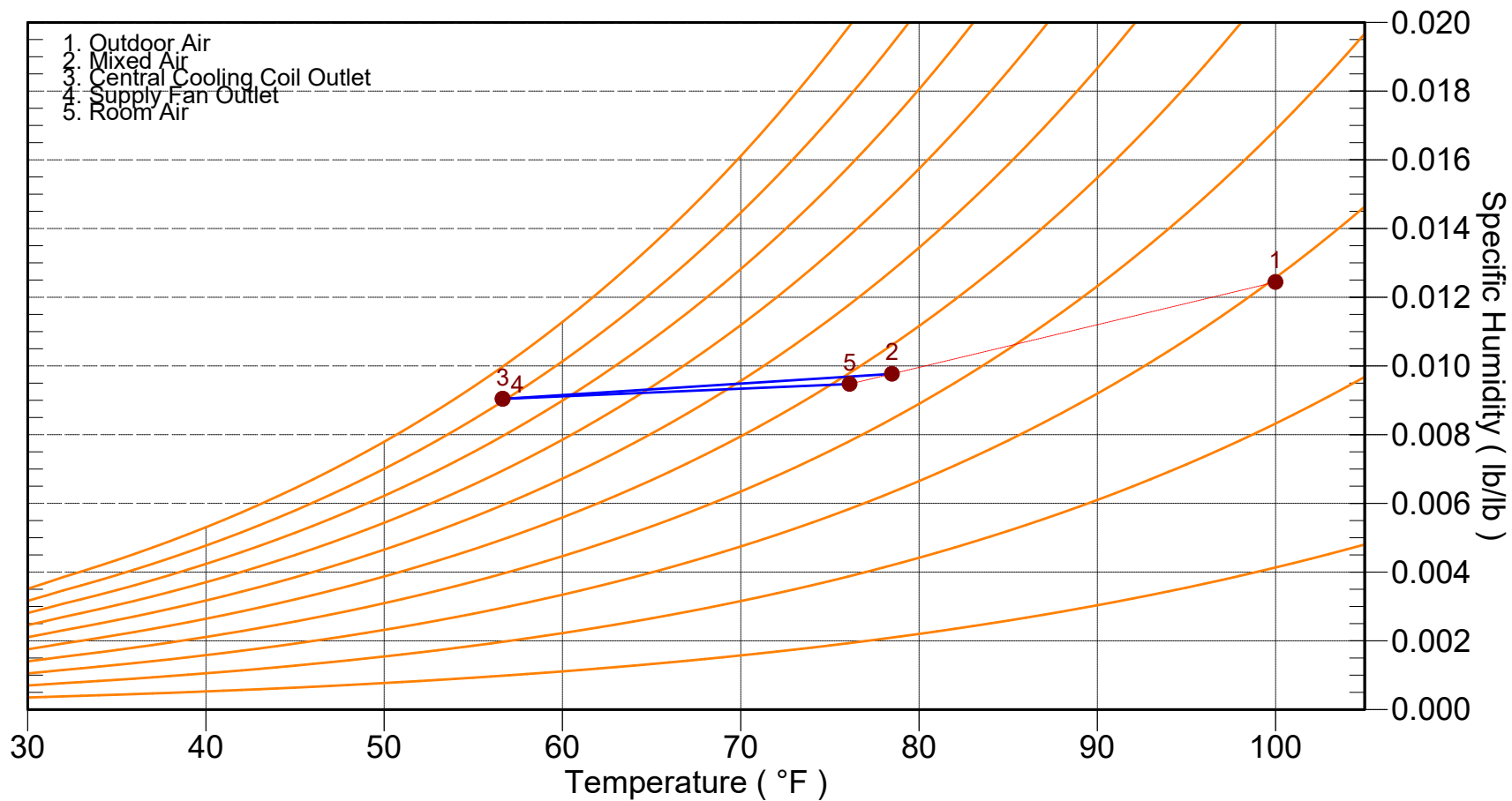
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Location: Dallas, Texas

Altitude: 597.0 ft.

Data for: July DESIGN COOLING DAY, 1500



System Psychrometrics for HVAC

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Location: Dallas, Texas
Altitude: 597.0 ft.
Data for: WINTER DESIGN HEATING

