

# Air System Sizing Summary for VAV Rooftop System

Project Name: Manufacturing Office  
Prepared by:

10/21/2005  
03:51PM

## Air System Information

Air System Name: **VAV Rooftop System**  
Air System Type: **VAV**

Number of zones: **7**  
Floor Area: **6000.0** sqft  
Location: **St. Louis IAP, Missouri**

## Sizing Calculation Information

Calculation Months: **May to Nov**

## Central Cooling Coil Sizing Data

Total coil load: **13.9** Tons  
Total coil load: **167.3** MBH  
Sensible coil load: **116.9** MBH  
Coil airflow: **3759** CFM  
Sensible heat ratio: **0.699**  
Area per unit load: **430.3** sqft/Ton  
Load per unit area: **27.9** BTU/(hr-sqft)

Load occurs at: **Jul 1500**  
OA DB / WB: **95.0/76.0** F  
Entering DB / WB: **83.1/67.6** F  
Leaving DB / WB: **53.6/52.6** F  
Coil ADP: **51.0** F  
Bypass Factor: **0.080**  
Resulting RH: **45** %  
Design supply temp: **55.0** F

## Preheat Coil Sizing Data

Max coil load: **9.5** MBH  
Coil airflow: **1280** CFM  
Max coil airflow: **3759** CFM

Load occurs at: **Des Htg**  
Ent DB / Lvg DB: **43.0/50.0** F

## Supply Fan Sizing Data

Actual max airflow: **3759** CFM  
Standard airflow: **3668** CFM  
Actual max airflow per unit area: **0.63** CFM/sqft

Fan motor BHP: **2.19** BHP  
Fan motor kW: **1.63** kW  
Fan static: **2.00** in wg

## Outdoor Ventilation Air Data

Design airflow: **1280** CFM  
Airflow per unit floor area: **0.21** CFM/sqft

Airflow per person: **20.00** CFM/person

## Zone Sizing Data

Zone Name	Maximum Cooling Sensible MBH	Design Airflow CFM	Minimum Air Flow CFM	Time of Peak Load	Maximum Heating Load MBH	Zone Floor Area sqft	Zone CFM/sqft	Reheat Coil Load MBH
1 Conference Room	7.4	351	240	Jul 1500	6.4	375.0	0.93	10.2
2 Assistant manager	3.4	161	40	Jul 1500	3.8	225.0	0.72	4.4
3 Manager	5.5	260	40	Aug 1400	7.6	300.0	0.87	8.2
4 General Perimeter	18.7	886	200	Sep 1400	18.6	1050.0	0.84	21.8
5 Chief Engineer	5.0	238	40	Aug 1600	6.3	225.0	1.06	7.0
6 Engineering	11.9	564	120	Jul 1600	11.4	675.0	0.84	13.3
7 General Core	30.0	1425	600	Jul 1600	13.4	3150.0	0.45	22.9

# System Design Load Summary for VAV Rooftop System

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10/21/2005  
03:53PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 95 F / 76 F			HEATING DATA AT DES HTG HEATING OA DB / WB -6 F / -7.2 F		
ZONE LOADS	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window and Skylight Solar Loads	504 sqft	11010	-	504 sqft	-	-
Wall Transmission	2087 sqft	3337	-	2087 sqft	11261	-
Roof Transmission	6000 sqft	12907	-	6000 sqft	24624	-
Window Transmission	504 sqft	3877	-	504 sqft	17620	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Loads	49 sqft	2133	-	49 sqft	2048	-
Floor Transmission	6000 sqft	0	-	6000 sqft	4924	-
Partitions/Ceilings	850 sqft	481	-	850 sqft	638	-
Overhead Lighting	9000 W	25702	-	0 W	0	-
Electric Equipment	2100 W	6644	-	0 W	0	-
People	64	12132	13120	0	0	0
Infiltration	-	0	0	-	6344	1
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	78223	13120	-	67459	1
Thermostat and Pulldown Adjustment	-	11632	0	-	-2029	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	1280 CFM	24360	37315	436 CFM	34115	0
Supply Fan Load	3759 CFM	5573	-	1280 CFM	-2365	-
>> Total System Loads	-	119788	50435	-	97181	1
Central Cooling Coil	-	116867	50439	-	0	0
Preheat Coil	-	0	-	-	9485	-
Terminal Reheat Coils	-	0	-	-	87695	-
>> Total Coil Loads	-	116867	50439	-	97181	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 VAV Rooftop System

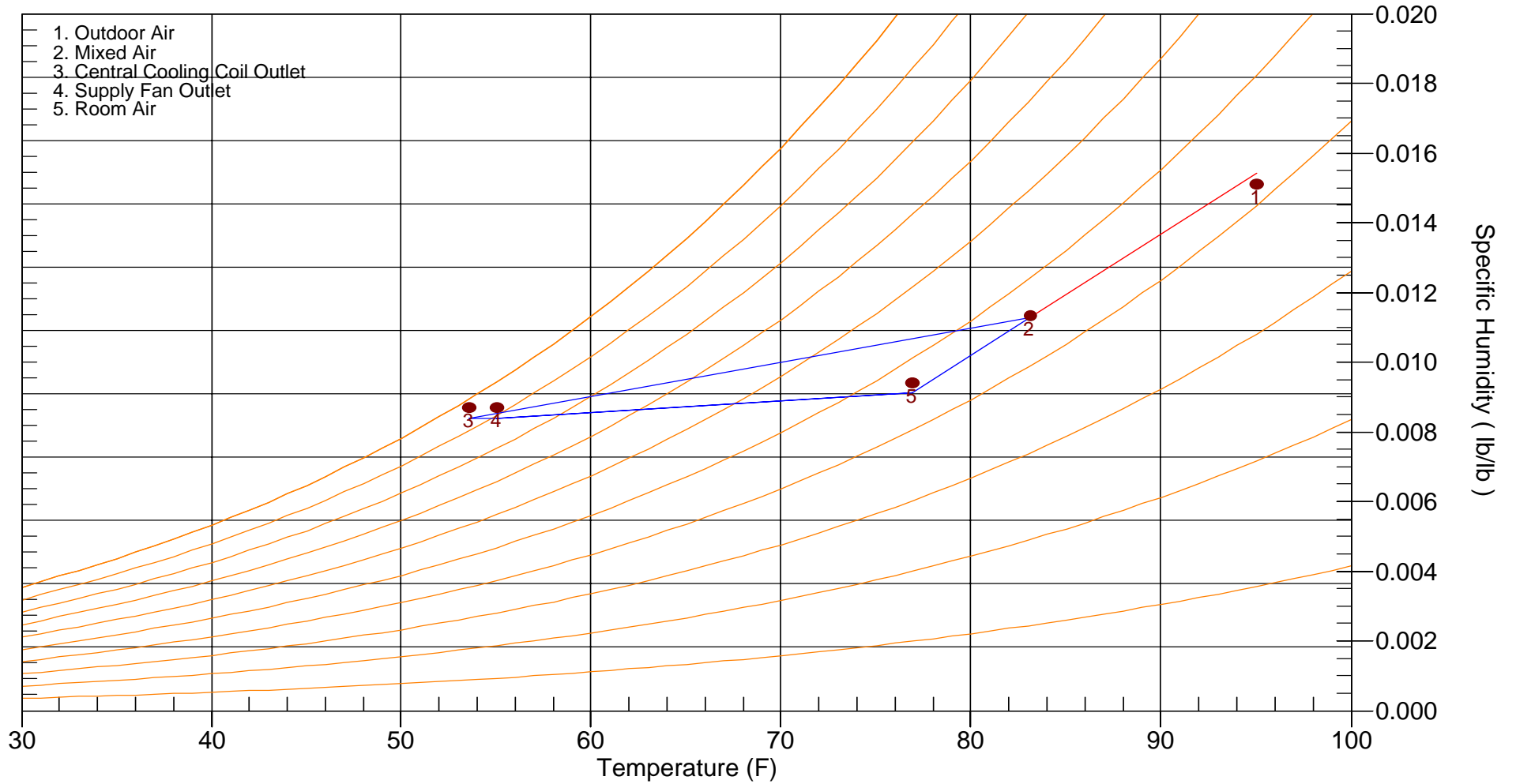
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03:56PM

Location: St. Louis IAP ,Missouri

Altitude: 673

Data for: Jul DESIGN COOLING DAY, 1500



# Ventilation Sizing Summary for VAV Rooftop System

Project Name: Manufacturing Office  
Prepared by:

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04:01PM

## Summary

Ventilation Sizing Method:.....ASHRAE Std 62-2001  
Design Ventilation Airflow Rate:.....1985 CFM  
Uncorrected Outdoor Airflow Rate:.....1280 CFM

## ASHRAE Std 62 Analysis Details

Critical Space:.....1 Conference Room  
Critical Space Outdoor Air Fraction (Z):.....0.685

Uncorrected Outdoor Air Fraction (X):.....0.329  
Corrected Outdoor Air Fraction (Y):.....0.511  
Required System Ventilation Airflow:.....1985 CFM

## Space Ventilation Analysis Table

Zone Name	Floor Area sqft	Maximum Occupants	Maximum Supply Air CFM	Required Outside Air CFM/person	Required Outside Air CFM/sqft	Required Outside Air CFM	Required Outside Air (% of supply)	Uncorrected Outdoor Air CFM	Uncorrected Outdoor Air Ratio (Z)	Corrected Outdoor Air CFM
1 Conference Room	375.0	12.0	350.5	20.00	0.00	0.0	0.0	240.0	0.685	179.1
2 Assistant manager	225.0	2.0	161.5	20.00	0.00	0.0	0.0	40.0	0.248	82.5
3 Manager	300.0	2.0	260.1	20.00	0.00	0.0	0.0	40.0	0.154	132.9
4 General Perimeter	1050.0	10.0	885.9	20.00	0.00	0.0	0.0	200.0	0.226	452.7
5 Chief Engineer	225.0	2.0	237.6	20.00	0.00	0.0	0.0	40.0	0.168	121.4
6 Engineering	675.0	6.0	563.9	20.00	0.00	0.0	0.0	120.0	0.213	288.1
7 General Core	3150.0	30.0	1425.4	20.00	0.00	0.0	0.0	600.0	0.421	728.4
<b>Totals</b>			<b>3885.0</b>					<b>1280.0</b>	<b>0.685</b>	<b>1985.2</b>

# Hourly Air System Design Day Loads for VAV Rooftop System

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DESIGN MONTH: Jul								
Hour	OA TEMP F	SUPPLY AIRFLOW CFM	CENTRAL COOLING SENSIBLE MBH	CENTRAL COOLING TOTAL MBH	CENTRAL HEATING COIL MBH	PREHEAT COIL MBH	TERMINAL COOLING COILS MBH	TERMINAL HEATING COILS MBH
0000	80.0	0	0.0	0.0	0.0	0.0	0.0	0.0
0100	79.1	0	0.0	0.0	0.0	0.0	0.0	0.0
0200	78.2	0	0.0	0.0	0.0	0.0	0.0	0.0
0300	77.4	0	0.0	0.0	0.0	0.0	0.0	0.0
0400	76.9	0	0.0	0.0	0.0	0.0	0.0	0.0
0500	76.7	72	2.2	2.2	0.0	0.0	0.0	0.0
0600	77.1	182	5.7	5.7	0.0	0.0	0.0	0.0
0700	78.0	3759	94.5	144.0	0.0	0.0	0.0	0.0
0800	79.6	3759	96.0	145.6	0.0	0.0	0.0	0.0
0900	82.0	3759	99.0	148.7	0.0	0.0	0.0	0.0
1000	84.8	3759	102.6	152.5	0.0	0.0	0.0	0.0
1100	87.9	3759	106.9	156.9	0.0	0.0	0.0	0.0
1200	90.8	3759	111.0	161.2	0.0	0.0	0.0	0.0
1300	93.0	3759	114.1	164.4	0.0	0.0	0.0	0.0
1400	94.5	3759	116.1	166.5	0.0	0.0	0.0	0.0
1500	95.0	3759	116.9	167.3	0.0	0.0	0.0	0.0
1600	94.5	3759	116.0	166.4	0.0	0.0	0.0	0.0
1700	93.2	3759	114.0	164.3	0.0	0.0	0.0	0.0
1800	91.2	3759	110.7	160.9	0.0	0.0	0.0	0.0
1900	88.8	0	0.0	0.0	0.0	0.0	0.0	0.0
2000	86.4	0	0.0	0.0	0.0	0.0	0.0	0.0
2100	84.4	0	0.0	0.0	0.0	0.0	0.0	0.0
2200	82.6	0	0.0	0.0	0.0	0.0	0.0	0.0
2300	81.1	0	0.0	0.0	0.0	0.0	0.0	0.0