

Air System Sizing Summary for IAT AC-North

Project Name: IAT Warehouse
Prepared by: Todaro Engineering

09/27/2011
10:19PM

Air System Information

Air System Name	IAT AC-North	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	950.0 ft ²
Air System Type	SZCAV	Location	Miami IAP, Florida

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Sum of space airflow rates	Calculation Months	Jan to Dec
Space CFM	Individual peak space loads	Sizing Data	User-Modified

Central Cooling Coil Sizing Data

Total coil load	3.4 Tons	Load occurs at	Jul 1600
Total coil load	41.3 MBH	OA DB / WB	89.5 / 78.1 °F
Sensible coil load	36.0 MBH	Entering DB / WB	83.3 / 67.5 °F
Coil CFM at Jul 1600	1400 CFM	Leaving DB / WB	59.5 / 58.0 °F
Max block CFM	1400 CFM	Coil ADP	56.8 °F
Sum of peak zone CFM	1400 CFM	Bypass Factor	0.100
Sensible heat ratio	0.870	Resulting RH	42 %
ft ² /Ton	275.7	Design supply temp.	60.0 °F
BTU/(hr-ft ²)	43.5	Zone T-stat Check	0 of 1 OK
Water flow @ 10.0 °F rise	N/A	Max zone temperature deviation	1.6 °F

Supply Fan Sizing Data

Actual max CFM	1400 CFM	Fan motor BHP	0.31 BHP
Standard CFM	1399 CFM	Fan motor kW	0.23 kW
Actual max CFM/ft ²	1.47 CFM/ft ²	Fan static	0.75 in wg

Outdoor Ventilation Air Data

Design airflow CFM	137 CFM	CFM/person	0.00 CFM/person
CFM/ft ²	0.14 CFM/ft ²		

Zone Sizing Summary for IAT AC-North

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Air System Information

Air System Name IAT AC-North
 Equipment Class SPLT AHU
 Air System Type SZCAV

Number of zones 1
 Floor Area 950.0 ft²
 Location Miami IAP, Florida

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM Sum of space airflow rates
 Space CFM Individual peak 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	52.6	1400	1400	Jul 1500	34.6	950.0	1.47

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							
North Space	1	52.6	Jul 1500	2709	34.6	950.0	2.85

Ventilation Sizing Summary for IAT AC-North

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1. Summary

Ventilation Sizing Method **ASHRAE Std 62-2001**
 Design Ventilation Airflow Rate **137** CFM
 Uncorrected Outdoor Airflow Rate **0** CFM

2. ASHRAE Std 62 Analysis Details

	Sizing Data For: Terminal boxes full open
Critical Space	
Critical Space Outdoor Air Fraction ('Z')	0.000
Uncorrected Outdoor Air Fraction ('X')	0.000
Corrected Outdoor Air Fraction ('Y')	0.000
Required System Ventilation Airflow (CFM)	0

3. Space Ventilation Analysis Table

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)	Uncorrected Outdoor Air Ratio 'Z'	Corrected Outdoor Air (CFM)
Zone 1											
North Space	1	950.0	0.0	2709.1	0.00	0.00	0.0	0.0	0.0	0.000	0.0
Totals (incl. Space Multipliers)				0.0					0.0	0.000	0.0

Air System Design Load Summary for IAT AC-North

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 89.5 °F / 78.1 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 51.1 °F / 51.1 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	25 ft²	2034	-	25 ft²	-	-
Wall Transmission	3296 ft²	21566	-	3296 ft²	18413	-
Roof Transmission	941 ft²	12383	-	941 ft²	7776	-
Window Transmission	16 ft²	193	-	16 ft²	241	-
Skylight Transmission	9 ft²	162	-	9 ft²	202	-
Door Loads	189 ft²	2024	-	189 ft²	2524	-
Floor Transmission	950 ft²	0	-	950 ft²	813	-
Partitions	1848 ft²	738	-	1848 ft²	4618	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	10788	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	49889	0	-	34588	0
Zone Conditioning	-	34196	0	-	0	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	1400 CFM	0	-	0 CFM	0	-
Ventilation Load	137 CFM	1010	5361	0 CFM	0	0
Supply Fan Load	1400 CFM	778	-	0 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	35985	5361	-	0	0
Central Cooling Coil	-	35985	5363	-	0	0
>> Total Conditioning	-	35985	5363	-	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 IAT AC-North

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 89.8 °F / 78.2 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 51.1 °F / 51.1 °F		
	OCCUPIED T-STAT 78.0 °F			OCCUPIED T-STAT 63.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	25 ft²	1991	-	25 ft²	-	-
Wall Transmission	3296 ft²	20019	-	3296 ft²	18413	-
Roof Transmission	941 ft²	13392	-	941 ft²	7776	-
Window Transmission	16 ft²	196	-	16 ft²	241	-
Skylight Transmission	9 ft²	165	-	9 ft²	202	-
Door Loads	189 ft²	2056	-	189 ft²	2524	-
Floor Transmission	950 ft²	0	-	950 ft²	813	-
Partitions	1848 ft²	737	-	1848 ft²	4618	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1050 W	2642	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	4	655	820	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	10788	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	52640	820	-	34588	0

Space Design Load Summary for IAT AC-North

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TABLE 1.1.A. COMPONENT LOADS FOR SPACE " North Space " IN ZONE " Zone 1 "

		DESIGN COOLING		DESIGN HEATING		
		COOLING DATA AT Jul 1500 COOLING OA DB / WB 89.8 °F / 78.2 °F OCCUPIED T-STAT 78.0 °F		HEATING DATA AT DES HTG HEATING OA DB / WB 51.1 °F / 51.1 °F OCCUPIED T-STAT 63.0 °F		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(BTU/hr)	(BTU/hr)	Details	(BTU/hr)	(BTU/hr)
Window & Skylight Solar Loads	25 ft²	1991	-	25 ft²	-	-
Wall Transmission	3296 ft²	20019	-	3296 ft²	18413	-
Roof Transmission	941 ft²	13392	-	941 ft²	7776	-
Window Transmission	16 ft²	196	-	16 ft²	241	-
Skylight Transmission	9 ft²	165	-	9 ft²	202	-
Door Loads	189 ft²	2056	-	189 ft²	2524	-
Floor Transmission	950 ft²	0	-	950 ft²	813	-
Partitions	1848 ft²	737	-	1848 ft²	4618	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1050 W	2642	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	4	655	820	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	10788	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	52640	820	-	34588	0

TABLE 1.1.B. ENVELOPE LOADS FOR SPACE " North Space " 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)
N EXPOSURE						
WALL	2200	0.469	-	12431	-	12291
E EXPOSURE						
WALL	540	0.469	-	4334	-	3017
DOOR	21	0.700	-	142	-	175
W EXPOSURE						
WALL	116	0.469	-	750	-	647
WINDOW 1	16	1.250	0.950	196	1022	241
S EXPOSURE						
WALL	440	0.469	-	2503	-	2458
E EXPOSURE						
DOOR	168	1.175	-	1914	-	2349
H EXPOSURE						
ROOF	941	0.694	-	13392	-	7776
SKYLIGHT	9	1.890	0.950	165	969	202

Hourly Air System Design Day Loads for IAT AC-North

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DESIGN MONTH: JULY

Hour	OA TEMP (°F)	SUPPLY AIRFLOW (CFM)	CENTRAL COOLING SENSIBLE (MBH)	CENTRAL COOLING TOTAL (MBH)	CENTRAL HEATING COIL (MBH)	PRECOOL COIL (MBH)	PREHEAT COIL (MBH)	TERMINAL COOLING (MBH)	TERMINAL HEATING (MBH)	ZONE HEATING UNIT (MBH)
0000	80.5	1279	29.3	34.1	0.0	0.0	0.0	0.0	0.0	0.0
0100	79.9	1222	27.7	32.3	0.0	0.0	0.0	0.0	0.0	0.0
0200	79.3	1162	26.1	30.5	0.0	0.0	0.0	0.0	0.0	0.0
0300	78.9	1105	24.7	28.8	0.0	0.0	0.0	0.0	0.0	0.0
0400	78.5	1051	23.3	27.2	0.0	0.0	0.0	0.0	0.0	0.0
0500	78.4	1003	22.1	25.9	0.0	0.0	0.0	0.0	0.0	0.0
0600	78.6	973	21.4	25.1	0.0	0.0	0.0	0.0	0.0	0.0
0700	79.2	991	21.9	25.6	0.0	0.0	0.0	0.0	0.0	0.0
0800	80.2	1063	23.8	27.8	0.0	0.0	0.0	0.0	0.0	0.0
0900	81.7	1157	26.3	30.7	0.0	0.0	0.0	0.0	0.0	0.0
1000	83.4	1258	29.1	33.9	0.0	0.0	0.0	0.0	0.0	0.0
1100	85.4	1356	32.0	37.1	0.0	0.0	0.0	0.0	0.0	0.0
1200	87.2	1400	33.8	39.2	0.0	0.0	0.0	0.0	0.0	0.0
1300	88.5	1400	34.7	40.1	0.0	0.0	0.0	0.0	0.0	0.0
1400	89.5	1400	35.4	40.8	0.0	0.0	0.0	0.0	0.0	0.0
1500	89.8	1400	35.9	41.2	0.0	0.0	0.0	0.0	0.0	0.0
1600	89.5	1400	36.0	41.3	0.0	0.0	0.0	0.0	0.0	0.0
1700	88.7	1400	35.8	41.2	0.0	0.0	0.0	0.0	0.0	0.0
1800	87.4	1400	35.3	40.6	0.0	0.0	0.0	0.0	0.0	0.0
1900	85.9	1400	34.6	40.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	84.4	1400	34.0	39.3	0.0	0.0	0.0	0.0	0.0	0.0
2100	83.2	1400	33.3	38.6	0.0	0.0	0.0	0.0	0.0	0.0
2200	82.0	1396	32.6	37.9	0.0	0.0	0.0	0.0	0.0	0.0
2300	81.1	1337	30.9	35.9	0.0	0.0	0.0	0.0	0.0	0.0

Hourly Zone Loads for IAT AC-North

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ZONE: Zone 1 DESIGN MONTH: JULY									
Hour	OA TEMP (°F)	ZONE TEMP (°F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENSIBLE LOAD (BTU/hr)	ZONE COND (BTU/hr)	TERMINAL COOLING COIL (BTU/hr)	TERMINAL HEATING COIL (BTU/hr)	ZONE HEATING UNIT (BTU/hr)
0000	80.5	80.7	45	1279.0	35160.4	28582.8	0.0	0.0	0.0
0100	79.9	80.6	45	1221.6	33148.2	27117.4	0.0	0.0	0.0
0200	79.3	80.4	45	1162.2	31100.2	25619.8	0.0	0.0	0.0
0300	78.9	80.3	46	1105.1	29178.7	24202.8	0.0	0.0	0.0
0400	78.5	80.2	46	1051.3	27404.3	22882.9	0.0	0.0	0.0
0500	78.4	80.1	46	1003.4	25861.2	21719.9	0.0	0.0	0.0
0600	78.6	80.0	46	973.4	24957.1	21000.1	0.0	0.0	0.0
0700	79.2	80.0	46	990.6	25672.0	21412.2	0.0	0.0	0.0
0800	80.2	80.2	46	1062.6	28276.0	23157.6	0.0	0.0	0.0
0900	81.7	80.4	45	1156.8	31677.3	25486.3	0.0	0.0	0.0
1000	83.4	80.7	45	1257.8	35361.4	28037.7	0.0	0.0	0.0
1100	85.4	80.9	45	1356.1	39000.7	30581.2	0.0	0.0	0.0
1200	87.2	81.3	44	1400.0	42400.2	32177.4	0.0	0.0	0.0
1300	88.5	81.8	43	1400.0	45398.5	32944.1	0.0	0.0	0.0
1400	89.5	82.2	42	1400.0	47788.7	33576.5	0.0	0.0	0.0
1500	89.8	82.5	42	1400.0	49342.5	34009.7	0.0	0.0	0.0
1600	89.5	82.6	42	1400.0	49889.1	34195.9	0.0	0.0	0.0
1700	88.7	82.6	42	1400.0	49403.1	34122.9	0.0	0.0	0.0
1800	87.4	82.3	42	1400.0	47790.8	33762.3	0.0	0.0	0.0
1900	85.9	82.0	43	1400.0	45666.2	33260.6	0.0	0.0	0.0
2000	84.4	81.7	43	1400.0	43617.1	32763.5	0.0	0.0	0.0
2100	83.2	81.3	44	1400.0	41521.3	32244.3	0.0	0.0	0.0
2200	82.0	81.0	44	1396.3	39379.1	31640.5	0.0	0.0	0.0
2300	81.1	80.8	45	1337.2	37240.0	30089.7	0.0	0.0	0.0

System Psychrometrics for IAT AC-North

Project Name: IAT Warehouse
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July DESIGN COOLING DAY, 1600

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	89.5	0.01818	137	400	1010	5361
Vent - Return Mixing	Outlet	83.3	0.01074	1400	485	-	-
Central Cooling Coil	Outlet	59.5	0.00993	1400	485	35985	5363
Supply Fan	Outlet	60.0	0.00993	1400	485	778	-
Cold Supply Duct	Outlet	60.0	0.00993	1400	485	-	-
Zone Air	-	82.6	0.00993	1400	495	34196	0
Return Plenum	Outlet	82.6	0.00993	1400	495	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.079 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4744.4 BTU/(hr-CFM)

Site Altitude = 13.0 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	49889	Cooling	34196	82.6	1400	495	0	0

System Psychrometrics for IAT AC-North

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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	51.1	0.00795	0	400	0	0
Vent - Return Mixing	Outlet	0.0	0.00000	0	0	-	-
Central Cooling Coil	Outlet	0.0	0.00000	0	0	0	0
Supply Fan	Outlet	0.0	0.00000	0	0	0	-
Zone Air	-	0.0	0.00000	0	0	0	0
Return Plenum	Outlet	78.2	0.00000	0	0	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.079 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4744.4 BTU/(hr-CFM)

Site Altitude = 13.0 ft

TABLE 2: ZONE DATA

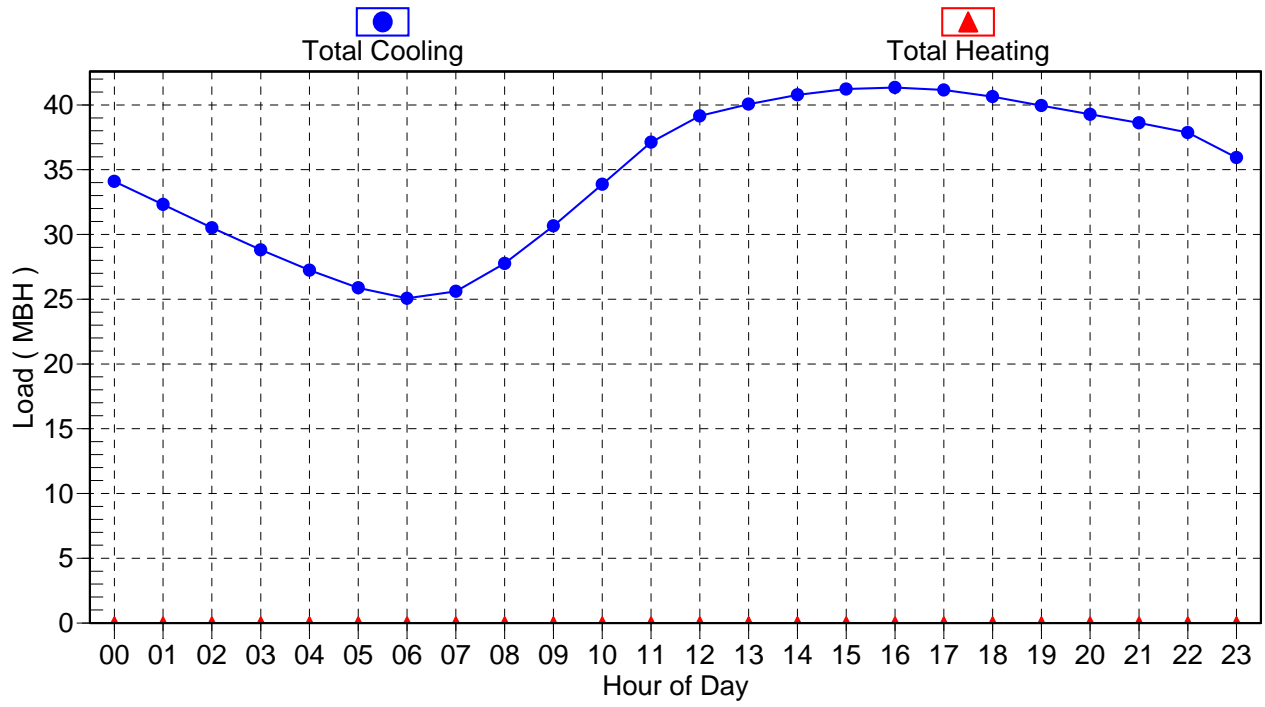
Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	-34588	Deadband	0	51.0	0	0	0	0

Hourly Air System Design Day Loads for IAT AC-North

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Data for July



Hourly Zone Design Day Loads for IAT AC-North

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Zone: Zone 1

Data for July

