

Air System Sizing Summary for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

Air System Information

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

Number Of Zones **7**
Floor Area **6000.0** sqft
Location **St. Louis IAP, Missouri**

Sizing Calculation Information

Calculation Months **Jan to Dec**

Calculation Method **Radiant Time Series**

Central Cooling Coil Sizing data

Total Coil Load **14.0** Tons
Total Coil Load **168.2** MBH
Sensible Coil Load **103.5** MBH
Coil Airflow **2796** CFM
Sensible Heat Ratio **0.616**
Area per unit load **428.2** sqft/Ton
Load per unit area **28.0** BTU/(hr sqft)

Load occurs at **Jul 1500**
OA DB / WB **95.0/76.0** F
Entering DB / WB **88.6/72.0** F
Leaving DB / WB **53.6/52.6** F
Coil ADP **50.6** F
Bypass Factor **0.080**
Resulting RH **48** %
Design Supply Temp. **55.0** F

Preheat Coil Sizing Data

Max Coil Load **99.3** MBH
Coil Airflow **1929** CFM
Max Coil Airflow **2796** CFM

Load Occurs At **Des Htg**
Ent DB / Lvg DB **4.4/53.0** F

Supply Fan Sizing Data

Actual Max Airflow **2796** CFM
Standard Airflow **2740** CFM
Actual Max Airflow per area **0.47** CFM/sqft

Fan Motor BHP **1.63** BHP
Fan Motor KW **1.21** kW
Fan Static **2.00** in wg

Outdoor Ventilation Air Data

Design Airflow **1861** CFM
Airflow per unit area **0.31** CFM/sqft

Airflow per person **29.08** CFM/person

Zone Sizing Data

Zone Name	Maximum Cooling Sensible (MBH)	Design Airflow (CFM)	Minimum Airflow (CFM)	Time Of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (sqft)	Zone (CFM/sqft)	Reheat Coil Load (MBH)
1 Conference Room	6.9	328	240	Jul 900	4.5	375.0	0.88	8.3
2 Assistant Manager	3.0	140	85	Jul 900	2.7	225.0	0.62	4.0
3 Manager	4.6	215	131	Aug 1300	5.1	300.0	0.72	7.2
4 General Perimeter	15.2	718	437	Oct 1300	13.9	1050.0	0.68	20.8
5 Chief Engineer	4.5	211	129	Aug 1600	4.2	225.0	0.94	6.2
6 Engineering	10.7	504	307	Jul 1700	8.1	675.0	0.75	12.9
7 General Core	19.9	941	600	Jul 1800	6.9	3150.0	0.30	16.4

System Design Load Summary for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Jul 1500 OA DB / WB 95 F / 76 F			Design Heating Day OA DB / WB 2 F / 0.3 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	504 sqft	12243	-	504 sqft	-	-
Wall Transmission	2087 sqft	2073	-	2087 sqft	7663	-
Roof Transmission	6000 sqft	4030	-	6000 sqft	12474	-
Window Transmission	504 sqft	3047	-	504 sqft	12338	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	49 sqft	1477	-	49 sqft	2099	-
Floor Transmission	6000 sqft	0	-	6000 sqft	5014	-
Partitions/Ceilings	850 sqft	450	-	850 sqft	502	-
Overhead Lighting	3979 W	12575	-	0 W	0	-
Electric Equipment	2100 W	6956	-	0 W	0	-
People	64	14702	13120	0	0	0
Infiltration	-	0	0	-	5229	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	57552	13120	-	45320	0
Thermostat and Pulldown Adjustment	-	7289	0	-	-304	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Ventilation Load	1861 CFM	37776	51519	1861 CFM	132940	0
Supply Fan Load	2796 CFM	4145	-	1929 CFM	-2938	-
>> Total System Loads	-	106762	64639	-	175017	0
Central Cooling Coil	-	103518	64642	-	0	0
Preheat Coil	-	0	-	-	99261	-
Terminal Reheat Coil	-	0	-	-	75756	-
>> Total Coil Loads	-	103518	64642	-	175017	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 VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

1 Conference Room Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Jul 0900			Design Heating Day		
	OA DB / WB 82 F / 72.5 F			OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	60 sqft	2754	-	60 sqft	-	-
Wall Transmission	240 sqft	164	-	240 sqft	881	-
Roof Transmission	375 sqft	52	-	375 sqft	780	-
Window Transmission	60 sqft	129	-	60 sqft	1469	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	0 sqft	0	-	0 sqft	0	-
Floor Transmission	375 sqft	0	-	375 sqft	626	-
Partitions/Ceilings	128 sqft	41	-	128 sqft	75	-
Overhead Lighting	364 W	981	-	0 W	0	-
Electric Equipment	131 W	411	-	0 W	0	-
People	12	2418	2460	0	0	0
Infiltration	-	0	0	-	688	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6949	2460	-	4519	0

2 Assistant Manager Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Jul 0900			Design Heating Day		
	OA DB / WB 82 F / 72.5 F			OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	36 sqft	1652	-	36 sqft	-	-
Wall Transmission	144 sqft	98	-	144 sqft	529	-
Roof Transmission	225 sqft	31	-	225 sqft	468	-
Window Transmission	36 sqft	78	-	36 sqft	881	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	0 sqft	0	-	0 sqft	0	-
Floor Transmission	225 sqft	0	-	225 sqft	375	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	167 W	449	-	0 W	0	-
Electric Equipment	79 W	246	-	0 W	0	-
People	2	403	410	0	0	0
Infiltration	-	0	0	-	413	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2958	410	-	2666	0

Zone Design Load Summary for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

3 Manager Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Aug 1300			Design Heating Day		
	OA DB / WB 93 F / 75.5 F			OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	84 sqft	2199	-	84 sqft	-	-
Wall Transmission	336 sqft	332	-	336 sqft	1234	-
Roof Transmission	300 sqft	134	-	300 sqft	624	-
Window Transmission	84 sqft	430	-	84 sqft	2056	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	0 sqft	0	-	0 sqft	0	-
Floor Transmission	300 sqft	0	-	300 sqft	635	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	222 W	676	-	0 W	0	-
Electric Equipment	105 W	343	-	0 W	0	-
People	2	445	410	0	0	0
Infiltration	-	0	0	-	550	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4559	410	-	5100	0

4 General Perimeter Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Oct 1300			Design Heating Day		
	OA DB / WB 77 F / 67.4 F			OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	144 sqft	7096	-	144 sqft	-	-
Wall Transmission	647 sqft	128	-	647 sqft	2376	-
Roof Transmission	1050 sqft	-151	-	1050 sqft	2183	-
Window Transmission	144 sqft	-92	-	144 sqft	3525	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	49 sqft	2678	-	49 sqft	2099	-
Floor Transmission	1050 sqft	0	-	1050 sqft	1751	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	693 W	2110	-	0 W	0	-
Electric Equipment	368 W	1200	-	0 W	0	-
People	10	2227	2050	0	0	0
Infiltration	-	0	0	-	1927	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	15195	2050	-	13861	0

Zone Design Load Summary for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

5 Chief Engineer Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Aug 1600			Design Heating Day		
	OA DB / WB 94.5 F / 75.9 F			OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	72 sqft	2297	-	72 sqft	-	-
Wall Transmission	288 sqft	316	-	288 sqft	1058	-
Roof Transmission	225 sqft	159	-	225 sqft	468	-
Window Transmission	72 sqft	442	-	72 sqft	1763	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	0 sqft	0	-	0 sqft	0	-
Floor Transmission	225 sqft	0	-	225 sqft	501	-
Partitions/Ceilings	0 sqft	0	-	0 sqft	0	-
Overhead Lighting	167 W	533	-	0 W	0	-
Electric Equipment	79 W	262	-	0 W	0	-
People	2	464	410	0	0	0
Infiltration	-	0	0	-	413	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4473	410	-	4201	0

6 Engineering Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Jul 1700			Design Heating Day		
	OA DB / WB 93.2 F / 75.5 F			OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	108 sqft	5281	-	108 sqft	-	-
Wall Transmission	432 sqft	505	-	432 sqft	1586	-
Roof Transmission	675 sqft	530	-	675 sqft	1403	-
Window Transmission	108 sqft	650	-	108 sqft	2644	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	0 sqft	0	-	0 sqft	0	-
Floor Transmission	675 sqft	0	-	675 sqft	1126	-
Partitions/Ceilings	128 sqft	67	-	128 sqft	75	-
Overhead Lighting	446 W	1442	-	0 W	0	-
Electric Equipment	236 W	790	-	0 W	0	-
People	6	1406	1230	0	0	0
Infiltration	-	0	0	-	1239	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	10672	1230	-	8073	0

Zone Design Load Summary for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

7 General Core Zone Loads based on RTS	DESIGN COOLING			DESIGN HEATING		
	Jul 1800 OA DB / WB 91.2 F / 75 F			Design Heating Day OA DB / WB 2 F / 0.3 F		
	Thermostat Setpoint 75.0 F			Thermostat Setpoint 70.0 F		
	Details	Sensible BTU/hr	Latent BTU/hr	Details	Sensible BTU/hr	Latent BTU/hr
Window & Skylight Solar Loads	0 sqft	0	-	0 sqft	-	-
Wall Transmission	0 sqft	0	-	0 sqft	0	-
Roof Transmission	3150 sqft	2501	-	3150 sqft	6549	-
Window Transmission	0 sqft	0	-	0 sqft	0	-
Skylight Transmission	0 sqft	0	-	0 sqft	0	-
Door Transmission	0 sqft	0	-	0 sqft	0	-
Floor Transmission	3150 sqft	0	-	3150 sqft	0	-
Partitions/Ceilings	595 sqft	303	-	595 sqft	351	-
Overhead Lighting	1922 W	6296	-	0 W	0	-
Electric Equipment	1103 W	3702	-	0 W	0	-
People	30	7103	6150	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	-	19905	6150	-	6900	0

System Psychrometrics for VAV Rooftop

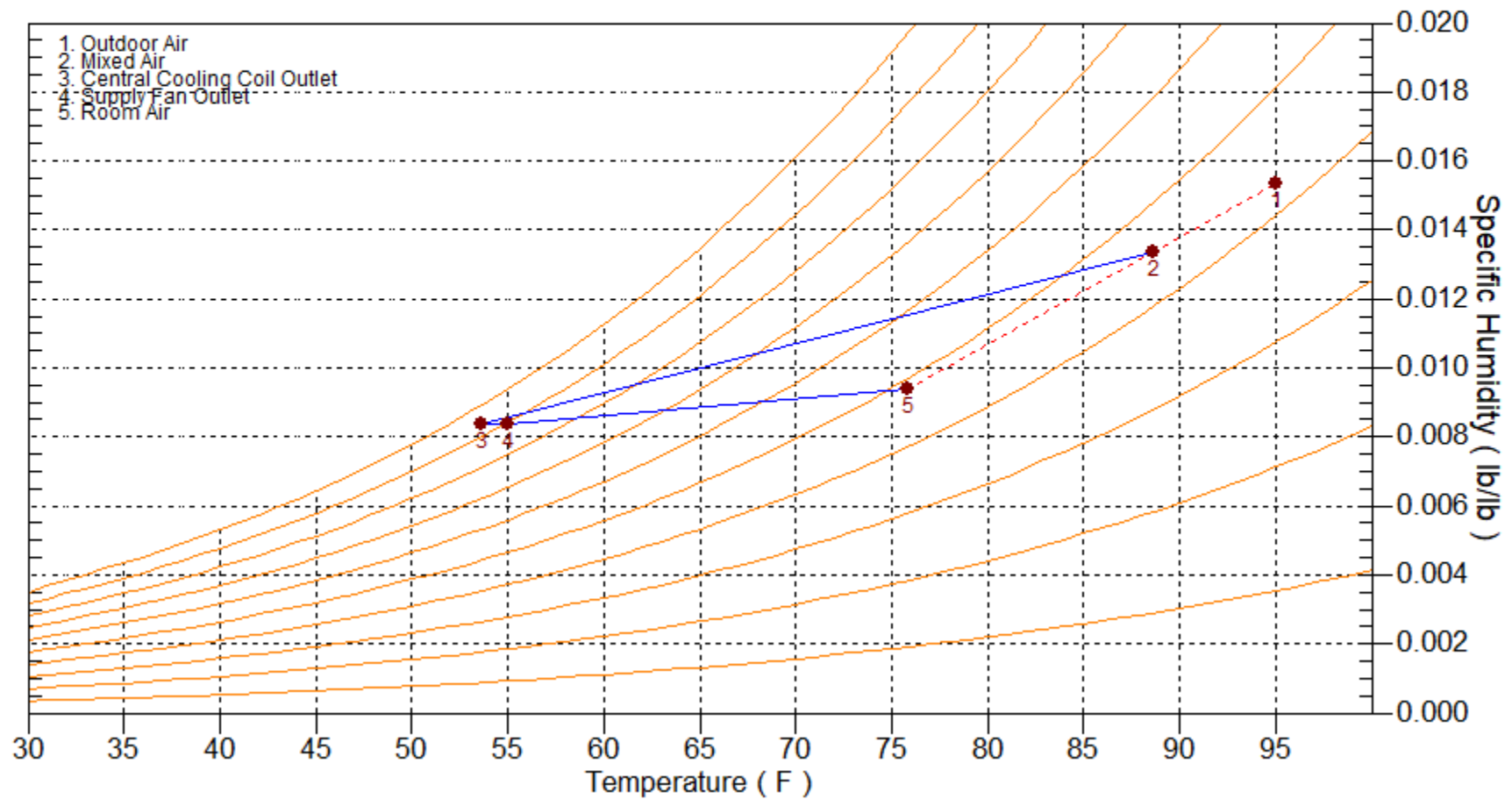
BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

Location: St. Louis IAP, Missouri

Altitude: 564.0 ft.

Data for: Jul DESIGN COOLING DAY, 1500



Ventilation Sizing Summary for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

Summary

Ventilation Sizing Method **ASHRAE Std 62-2001**
Design Ventilation Airflow Rate **1861** CFM
Uncorrected Outdoor Airflow Rate **1280** CFM

ASHRAE Std 62 Analysis Details

Critical Space **1 Conference Room**
Critical Space Outdoor Air Fraction (Z) **0.731**

Uncorrected Air Fraction (X) **0.419**
Corrected Outdoor Air Fraction (Y) **0.609**
Required System Ventilation Airflow **1861** 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	328.4	20.0	0.00	0.0	0.0	240.0	0.731	199.9
2 Assistant Manager	225.0	2.0	139.8	20.0	0.00	0.0	0.0	40.0	0.286	85.1
3 Manager	300.0	2.0	215.4	20.0	0.00	0.0	0.0	40.0	0.186	131.1
4 General Perimeter	1050.0	10.0	718.0	20.0	0.00	0.0	0.0	200.0	0.279	437.0
5 Chief Engineer	225.0	2.0	211.4	20.0	0.00	0.0	0.0	40.0	0.189	128.7
6 Engineering	675.0	6.0	504.3	20.0	0.00	0.0	0.0	120.0	0.238	306.9
7 General Core	3150.0	30.0	940.6	20.0	0.00	0.0	0.0	600.0	0.638	572.5
Totals			3057.7					1280.0	0.731	1861.2

Hourly Air System Design Day Loads for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

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 COIL (MBH)	TERMINAL HEATING COIL (MBH)
0000	80.0	108	2.9	2.9	0.0	0.0	0.0	0.0
0100	79.1	89	2.4	2.4	0.0	0.0	0.0	0.0
0200	78.2	71	1.9	1.9	0.0	0.0	0.0	0.0
0300	77.4	53	1.4	1.4	0.0	0.0	0.0	0.0
0400	76.9	40	1.1	1.1	0.0	0.0	0.0	0.0
0500	76.7	79	2.1	2.1	0.0	0.0	0.0	0.0
0600	77.1	389	10.5	10.5	0.0	0.0	0.0	0.0
0700	78.0	2772	69.5	131.6	0.0	0.0	0.0	0.0
0800	79.6	2749	72.3	134.6	0.0	0.0	0.0	0.0
0900	82.0	2759	77.3	139.9	0.0	0.0	0.0	0.0
1000	84.8	2784	83.2	146.4	0.0	0.0	0.0	0.0
1100	87.9	2796	89.6	153.2	0.0	0.0	0.0	0.0
1200	90.8	2796	95.3	159.3	0.0	0.0	0.0	0.0
1300	93.0	2796	99.6	164.0	0.0	0.0	0.0	0.0
1400	94.5	2796	102.5	167.0	0.0	0.0	0.0	0.0
1500	95.0	2796	103.5	168.2	0.0	0.0	0.0	0.0
1600	94.5	2796	102.4	167.0	0.0	0.0	0.0	0.0
1700	93.2	2796	99.9	164.2	0.0	0.0	0.0	0.0
1800	91.2	2796	95.8	159.8	0.0	0.0	0.0	0.0
1900	88.8	240	6.5	6.5	0.0	0.0	0.0	0.0
2000	86.4	209	5.6	5.6	0.0	0.0	0.0	0.0
2100	84.4	172	4.6	4.6	0.0	0.0	0.0	0.0
2200	82.6	146	3.9	3.9	0.0	0.0	0.0	0.0
2300	81.1	124	3.4	3.4	0.0	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

Hourly Zone Loads for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

ZONE: 1 Conference Room								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	80.0	38	12.9	1507.0	0.0	0.0	0.0
0100	79.1	80.0	38	10.6	1359.5	0.0	0.0	0.0
0200	78.2	80.0	38	8.5	1209.1	0.0	0.0	0.0
0300	77.4	80.0	38	6.4	1044.0	0.0	0.0	0.0
0400	76.9	80.0	38	4.8	897.2	0.0	0.0	0.0
0500	76.7	80.0	38	10.2	1075.6	0.0	0.0	0.0
0600	77.1	80.1	38	46.6	2016.1	0.0	0.0	0.0
0700	78.0	76.8	50	328.4	5832.9	0.0	0.0	0.0
0800	79.6	77.2	50	328.4	6632.6	0.0	0.0	0.0
0900	82.0	77.3	49	328.4	6949.5	0.0	0.0	0.0
1000	84.8	77.2	49	328.4	6895.2	0.0	0.0	0.0
1100	87.9	76.9	49	325.8	6682.2	0.0	0.0	0.0
1200	90.8	76.7	49	323.1	6592.5	0.0	0.0	0.0
1300	93.0	76.5	49	319.8	6582.8	0.0	0.0	0.0
1400	94.5	76.4	48	315.9	6597.1	0.0	0.0	0.0
1500	95.0	76.3	48	311.9	6581.9	0.0	0.0	0.0
1600	94.5	76.1	49	311.9	6500.8	0.0	0.0	0.0
1700	93.2	75.9	49	314.5	6373.3	0.0	0.0	0.0
1800	91.2	75.6	49	323.6	6185.1	0.0	0.0	0.0
1900	88.8	80.0	38	28.7	3067.3	0.0	0.0	0.0
2000	86.4	80.0	38	24.9	2559.5	0.0	0.0	0.0
2100	84.4	80.0	38	20.6	2189.7	0.0	0.0	0.0
2200	82.6	80.0	38	17.4	1897.9	0.0	0.0	0.0
2300	81.1	80.0	38	14.8	1669.4	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

ZONE: 2 Assistant Manager								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	79.8	38	4.6	703.2	0.0	0.0	0.0
0100	79.1	79.8	38	3.8	637.4	0.0	0.0	0.0
0200	78.2	79.8	38	3.0	569.9	0.0	0.0	0.0
0300	77.4	79.7	38	2.3	493.4	0.0	0.0	0.0
0400	76.9	79.7	38	1.7	420.5	0.0	0.0	0.0
0500	76.7	80.0	38	3.3	542.5	0.0	0.0	0.0
0600	77.1	80.1	38	23.2	1121.2	0.0	0.0	0.0
0700	78.0	77.2	50	139.8	2476.0	0.0	0.0	0.0
0800	79.6	77.5	50	139.8	2840.8	0.0	0.0	0.0
0900	82.0	77.6	49	139.8	2957.7	0.0	0.0	0.0
1000	84.8	77.4	49	139.8	2872.7	0.0	0.0	0.0
1100	87.9	77.0	49	138.7	2706.1	0.0	0.0	0.0
1200	90.8	76.7	49	137.5	2627.6	0.0	0.0	0.0
1300	93.0	76.5	49	136.1	2597.6	0.0	0.0	0.0
1400	94.5	76.3	48	134.4	2582.5	0.0	0.0	0.0
1500	95.0	76.1	48	132.8	2550.6	0.0	0.0	0.0
1600	94.5	75.9	49	132.8	2487.3	0.0	0.0	0.0
1700	93.2	75.6	49	133.8	2397.1	0.0	0.0	0.0
1800	91.2	75.4	49	131.3	2271.4	0.0	0.0	0.0
1900	88.8	79.7	38	10.2	1337.4	0.0	0.0	0.0
2000	86.4	79.8	38	8.8	1148.9	0.0	0.0	0.0
2100	84.4	79.8	38	7.3	1000.4	0.0	0.0	0.0
2200	82.6	79.8	38	6.2	877.3	0.0	0.0	0.0
2300	81.1	79.8	38	5.3	777.7	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

Hourly Zone Loads for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

ZONE: 3 Manager								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	80.0	38	7.0	1247.6	0.0	0.0	0.0
0100	79.1	80.0	38	5.8	1125.4	0.0	0.0	0.0
0200	78.2	80.0	38	4.6	1002.0	0.0	0.0	0.0
0300	77.4	80.0	38	3.5	870.9	0.0	0.0	0.0
0400	76.9	80.0	38	2.6	749.0	0.0	0.0	0.0
0500	76.7	80.0	38	8.4	916.0	0.0	0.0	0.0
0600	77.1	80.1	38	40.7	1767.6	0.0	0.0	0.0
0700	78.0	76.7	50	215.4	3551.9	0.0	0.0	0.0
0800	79.6	77.1	50	215.4	4112.4	0.0	0.0	0.0
0900	82.0	77.2	49	215.4	4360.4	0.0	0.0	0.0
1000	84.8	77.1	49	215.4	4395.6	0.0	0.0	0.0
1100	87.9	76.9	49	213.7	4355.4	0.0	0.0	0.0
1200	90.8	76.9	49	212.0	4379.9	0.0	0.0	0.0
1300	93.0	76.7	49	209.8	4373.3	0.0	0.0	0.0
1400	94.5	76.5	48	207.2	4306.4	0.0	0.0	0.0
1500	95.0	76.3	48	204.6	4200.6	0.0	0.0	0.0
1600	94.5	76.0	49	204.6	4045.9	0.0	0.0	0.0
1700	93.2	75.6	49	206.3	3834.2	0.0	0.0	0.0
1800	91.2	75.4	49	199.9	3541.2	0.0	0.0	0.0
1900	88.8	80.0	38	15.7	2300.2	0.0	0.0	0.0
2000	86.4	80.0	38	13.6	2001.8	0.0	0.0	0.0
2100	84.4	80.0	38	11.2	1758.4	0.0	0.0	0.0
2200	82.6	80.0	38	9.5	1552.0	0.0	0.0	0.0
2300	81.1	80.0	38	8.1	1381.8	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

ZONE: 4 General Perimeter								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	78.7	38	23.5	3177.4	0.0	0.0	0.0
0100	79.1	78.7	38	19.3	2824.7	0.0	0.0	0.0
0200	78.2	78.7	38	15.4	2485.9	0.0	0.0	0.0
0300	77.4	78.7	38	11.6	2177.5	0.0	0.0	0.0
0400	76.9	78.7	38	8.7	1930.7	0.0	0.0	0.0
0500	76.7	78.7	38	17.0	1846.5	0.0	0.0	0.0
0600	77.1	79.0	38	82.7	2167.7	0.0	0.0	0.0
0700	78.0	75.2	50	563.5	6349.5	0.0	0.0	0.0
0800	79.6	75.2	50	558.7	7282.8	0.0	0.0	0.0
0900	82.0	75.2	49	571.4	8225.3	0.0	0.0	0.0
1000	84.8	75.3	49	595.6	9385.4	0.0	0.0	0.0
1100	87.9	75.3	49	621.5	10635.7	0.0	0.0	0.0
1200	90.8	75.4	49	636.9	11558.0	0.0	0.0	0.0
1300	93.0	75.4	49	634.6	11988.8	0.0	0.0	0.0
1400	94.5	75.4	48	616.0	11967.3	0.0	0.0	0.0
1500	95.0	75.3	48	592.2	11766.5	0.0	0.0	0.0
1600	94.5	75.3	49	573.3	11465.8	0.0	0.0	0.0
1700	93.2	75.3	49	555.3	11048.5	0.0	0.0	0.0
1800	91.2	75.2	49	540.9	10425.3	0.0	0.0	0.0
1900	88.8	78.7	38	52.2	6066.1	0.0	0.0	0.0
2000	86.4	78.8	38	45.3	5212.2	0.0	0.0	0.0
2100	84.4	78.8	38	37.4	4549.3	0.0	0.0	0.0
2200	82.6	78.7	38	31.7	3998.7	0.0	0.0	0.0
2300	81.1	78.7	38	27.0	3544.5	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

Hourly Zone Loads for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

ZONE: 5 Chief Engineer								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	80.0	38	11.3	1287.8	0.0	0.0	0.0
0100	79.1	80.0	38	9.4	1136.1	0.0	0.0	0.0
0200	78.2	80.0	38	7.4	999.7	0.0	0.0	0.0
0300	77.4	80.0	38	5.6	876.6	0.0	0.0	0.0
0400	76.9	80.0	38	4.2	774.1	0.0	0.0	0.0
0500	76.7	80.0	38	5.0	733.5	0.0	0.0	0.0
0600	77.1	80.0	38	24.3	845.0	0.0	0.0	0.0
0700	78.0	75.2	50	161.9	1787.1	0.0	0.0	0.0
0800	79.6	75.2	50	159.6	2035.3	0.0	0.0	0.0
0900	82.0	75.2	49	162.0	2275.6	0.0	0.0	0.0
1000	84.8	75.2	49	166.7	2548.5	0.0	0.0	0.0
1100	87.9	75.3	49	171.7	2842.0	0.0	0.0	0.0
1200	90.8	75.3	49	174.8	3072.6	0.0	0.0	0.0
1300	93.0	75.3	49	180.3	3360.8	0.0	0.0	0.0
1400	94.5	75.4	48	188.4	3717.2	0.0	0.0	0.0
1500	95.0	75.5	48	197.4	4092.0	0.0	0.0	0.0
1600	94.5	75.6	49	200.8	4329.9	0.0	0.0	0.0
1700	93.2	75.7	49	202.4	4387.5	0.0	0.0	0.0
1800	91.2	75.4	49	193.1	3913.2	0.0	0.0	0.0
1900	88.8	80.1	38	25.3	2522.5	0.0	0.0	0.0
2000	86.4	80.1	38	21.9	2137.3	0.0	0.0	0.0
2100	84.4	80.0	38	18.1	1861.6	0.0	0.0	0.0
2200	82.6	80.0	38	15.3	1637.6	0.0	0.0	0.0
2300	81.1	80.0	38	13.1	1446.5	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

ZONE: 6 Engineering								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	80.0	38	16.5	2884.8	0.0	0.0	0.0
0100	79.1	80.0	38	13.6	2541.2	0.0	0.0	0.0
0200	78.2	80.0	38	10.8	2240.0	0.0	0.0	0.0
0300	77.4	80.0	38	8.2	1966.0	0.0	0.0	0.0
0400	76.9	80.0	38	6.1	1737.9	0.0	0.0	0.0
0500	76.7	80.0	38	11.9	1608.6	0.0	0.0	0.0
0600	77.1	80.0	38	58.1	1709.6	0.0	0.0	0.0
0700	78.0	75.3	50	422.9	4185.3	0.0	0.0	0.0
0800	79.6	75.2	50	406.5	4654.9	0.0	0.0	0.0
0900	82.0	75.2	49	401.9	5068.9	0.0	0.0	0.0
1000	84.8	75.2	49	397.6	5422.9	0.0	0.0	0.0
1100	87.9	75.2	49	391.4	5745.6	0.0	0.0	0.0
1200	90.8	75.2	49	386.1	6045.5	0.0	0.0	0.0
1300	93.0	75.3	49	399.2	6804.5	0.0	0.0	0.0
1400	94.5	75.4	48	429.2	8007.8	0.0	0.0	0.0
1500	95.0	75.5	48	463.6	9313.7	0.0	0.0	0.0
1600	94.5	75.7	49	479.0	10232.6	0.0	0.0	0.0
1700	93.2	75.9	49	482.9	10672.0	0.0	0.0	0.0
1800	91.2	75.5	49	480.2	9615.8	0.0	0.0	0.0
1900	88.8	80.0	38	36.7	5845.6	0.0	0.0	0.0
2000	86.4	80.0	38	31.8	4882.0	0.0	0.0	0.0
2100	84.4	80.0	38	26.3	4221.3	0.0	0.0	0.0
2200	82.6	80.0	38	22.3	3696.2	0.0	0.0	0.0
2300	81.1	80.0	38	19.0	3248.6	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

Hourly Zone Loads for VAV Rooftop

BLK-4.2-Example-Problem
Carrier

12/14/2024
10:19AM

ZONE: 7 General Core								
DESIGN MONTH: Jul								
HOUR	OA TEMP (F)	ZONE TEMP (F)	RH (%)	ZONE AIRFLOW (CFM)	ZONE SENS. LOAD (BTU/hr)	TERMINAL CLG. COIL (BTU/hr)	TERMINAL HTG. COIL (BTU/hr)	ZONE HTG. UNIT (BTU/hr)
0000	80.0	77.7	38	32.2	4343.7	0.0	0.0	0.0
0100	79.1	77.7	38	26.6	3894.3	0.0	0.0	0.0
0200	78.2	77.7	38	21.1	3466.1	0.0	0.0	0.0
0300	77.4	77.7	38	15.9	3058.0	0.0	0.0	0.0
0400	76.9	77.7	38	11.9	2747.7	0.0	0.0	0.0
0500	76.7	77.7	38	23.3	2453.7	0.0	0.0	0.0
0600	77.1	77.7	38	113.5	2179.6	0.0	0.0	0.0
0700	78.0	76.0	50	940.6	13080.2	0.0	0.0	0.0
0800	79.6	76.0	50	940.6	14385.8	0.0	0.0	0.0
0900	82.0	76.0	49	940.6	15306.0	0.0	0.0	0.0
1000	84.8	76.0	49	940.6	16075.8	0.0	0.0	0.0
1100	87.9	76.0	49	933.3	16759.7	0.0	0.0	0.0
1200	90.8	76.0	49	925.6	17331.4	0.0	0.0	0.0
1300	93.0	76.0	49	916.1	17923.5	0.0	0.0	0.0
1400	94.5	76.1	48	904.8	18506.3	0.0	0.0	0.0
1500	95.0	76.1	48	893.5	19046.6	0.0	0.0	0.0
1600	94.5	76.1	49	893.5	19433.3	0.0	0.0	0.0
1700	93.2	76.1	49	900.7	19725.0	0.0	0.0	0.0
1800	91.2	76.1	49	927.0	19905.4	0.0	0.0	0.0
1900	88.8	77.8	38	71.7	8837.5	0.0	0.0	0.0
2000	86.4	77.8	38	62.2	7348.4	0.0	0.0	0.0
2100	84.4	77.8	38	51.4	6291.6	0.0	0.0	0.0
2200	82.6	77.7	38	43.6	5466.3	0.0	0.0	0.0
2300	81.1	77.7	38	37.1	4814.4	0.0	0.0	0.0
Loads calculated using Radiant Time Series								

DESIGN COOLING DAY, Jul 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (F)	Specific Humidity (lb/lb)	Airflow (CFM)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	95.0	0.01534	1861	37776	51519
Vent - Return Mixing	Outlet	88.6	0.01335	2796	-	-
Preheat Coil	Outlet	88.6	0.01335	2796	0	-
Central Cooling Coil	Outlet	53.6	0.00838	2796	103518	64642
Supply Fan	Outlet	55.0	0.00838	2796	4145	-
Zone Air	-	75.8	0.00939	2796	64841	13120
Return Plenum	Outlet	75.8	0.00939	2796	0	-

Site Altitude = 564.0 ft
Air Density x Heat Capacity x Conversion Factor = 1.0582 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor = 4650.7 BTU/(hr-CFM)

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	Zone T-stat Mode	Zone Temp (F)	Zone Airflow (CFM)	Reheat Coil Load (BTU/hr)
1 Conference Room	6582	Cooling	76.3	312	0
2 Assistant Manager	2551	Cooling	76.1	133	0
3 Manager	4201	Cooling	76.3	205	0
4 General Perimeter	11767	Cooling	75.3	592	0
5 Chief Engineer	4092	Cooling	75.5	197	0
6 Engineering	9314	Cooling	75.5	464	0
7 General Core	19047	Cooling	76.1	894	0