

RTU-4 SIZING SUMMARY

Air System Information
 Air System Name: RTU-4
 Equipment Class: PKG ROOF
 Air System Type: SZCAV
 Number of zones: 1
 Floor Area: 1002.0 ft²
 Location: Portland, Maine

Sizing Calculation Information
 Calculation Months: Jan to Dec
 Sizing Data: Calculated
 Zone CFM Sizing: Peak zone sensible load
 Space CFM Sizing: Coincident space loads

Central Cooling Coil Sizing Data
 Total coil load: 3.2 Tons
 Total coil load: 38.5 MBH
 Sensible coil load: 33.3 MBH
 Coil CFM at Aug 1500: 1321 CFM
 Max block CFM: 1321 CFM
 Sum of peak zone CFM: 1321 CFM
 Sensible heat ratio: 0.866
 RT/ton: 312.7
 BTU/(hr-ft²): 38.4
 Water flow @ 10.0 °F rise: N/A
 Load occurs at: Aug 1500
 OA DB / WB: 86.0 / 71.0 °F
 Entering DB / WB: 77.0 / 62.7 °F
 Leaving DB / WB: 53.6 / 52.3 °F
 Coil ADP: 51.0 °F
 Bypass Factor: 0.100
 Resulting RH: 44 %
 Design supply temp: 55.0 °F
 Zone T-stat Check: 0 of 1 OK
 Max zone temperature deviation: 0.4 °F

Central Heating Coil Sizing Data
 Max coil load: 30.8 MBH
 Coil CFM at Des Htg: 1321 CFM
 Max coil CFM: 1321 CFM
 Water flow @ 20.0 °F drop: N/A
 Load occurs at: Des Htg
 BTU/(hr-ft²): 30.7
 Ent. DB / Lvg DB: 57.1 / 78.7 °F

Supply Fan Sizing Data
 Actual max CFM: 1321 CFM
 Standard CFM: 1318 CFM
 Actual max CFM/ft²: 1.32 CFM/ft²
 Fan motor BHP: 0.72 BHP
 Fan motor kW: 0.57 kW
 Fan static: 2.00 in wg

Outdoor Ventilation Air Data
 Design airflow CFM: 197 CFM
 CFM/ft²: 0.20 CFM/ft²
 CFM/person: 52.60 CFM/person

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 Sizing Data: Calculated
 Zone CFM Sizing: Peak zone sensible load
 Space CFM Sizing: Coincident 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	1321	1321	1.32	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	27.1	Aug 1500	17.7	1002.0

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 (ft ²)	Space CFM/ft ²
Zone 1							
CORR	1	1.7	Aug 1500	82	1.4	218.0	0.38
EMPLOYEE	1	12.1	Aug 1500	589	9.9	350.0	1.68
OFFICE	1	8.7	Aug 1500	423	1.6	70.0	6.04
RESTROOMS	1	4.7	Aug 1500	228	4.9	364.0	0.63

1. Summary
 Ventilation Sizing Method: ASHRAE Std 62.1-2010
 Design Condition: Heating operation
 Occupant Diversity (D): 1.000
 Unconnected Outdoor Air Intake (Vou): 139 CFM
 System Ventilation Efficiency (Ev): 0.705
 Outdoor Air Intake (Vot): 197 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Supply Air (CFM)	Space Floor Area (ft ²)	Area Outdoor Air Rate (CFM/ft ²)	Time Averaged Occupancy (Occupants)	People Outdoor Air Rate (CFM/person)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (CFM)	Breathing Zone Outdoor Air (CFM)	Space Ventilation Efficiency (Evz)
Zone 1										
CORR	1	82	218.0	0.12	0.0	7.50	0.80	33	26	0.705
EMPLOYEE	1	589	350.0	0.12	1.8	7.50	0.80	69	55	0.588
OFFICE	1	423	70.0	0.06	2.0	5.00	0.80	18	14	1.063
RESTROOMS	1	228	364.0	0.12	0.0	7.50	0.80	65	44	0.866
Totals (incl. Space Multipliers)		1321						139	139	0.705

RTU-5 SIZING SUMMARY

Air System Information
 Air System Name: RTU-5
 Equipment Class: PKG ROOF
 Air System Type: SZCAV
 Number of zones: 1
 Floor Area: 3027.0 ft²
 Location: Portland, Maine

Sizing Calculation Information
 Calculation Months: Jan to Dec
 Sizing Data: Calculated
 Zone CFM Sizing: Peak zone sensible load
 Space CFM Sizing: Coincident space loads

Central Cooling Coil Sizing Data
 Total coil load: 3.2 Tons
 Total coil load: 38.3 MBH
 Sensible coil load: 24.4 MBH
 Coil CFM at Jul 1500: 741 CFM
 Max block CFM: 741 CFM
 Sum of peak zone CFM: 741 CFM
 Sensible heat ratio: 0.638
 RT/ton: 948.5
 BTU/(hr-ft²): 12.7
 Water flow @ 10.0 °F rise: N/A
 Load occurs at: Jul 1500
 OA DB / WB: 86.0 / 71.0 °F
 Entering DB / WB: 84.2 / 69.5 °F
 Leaving DB / WB: 53.6 / 52.5 °F
 Coil ADP: 50.2 °F
 Bypass Factor: 0.100
 Resulting RH: 46 %
 Design supply temp: 55.0 °F
 Zone T-stat Check: 0 of 1 OK
 Max zone temperature deviation: 1.8 °F

Central Heating Coil Sizing Data
 Max coil load: 44.5 MBH
 Coil CFM at Des Htg: 741 CFM
 Max coil CFM: 741 CFM
 Water flow @ 20.0 °F drop: N/A
 Load occurs at: Des Htg
 BTU/(hr-ft²): 14.7
 Ent. DB / Lvg DB: 10.9 / 66.6 °F

Supply Fan Sizing Data
 Actual max CFM: 741 CFM
 Standard CFM: 740 CFM
 Actual max CFM/ft²: 0.24 CFM/ft²
 Fan motor BHP: 0.41 BHP
 Fan motor kW: 0.32 kW
 Fan static: 2.00 in wg

Outdoor Ventilation Air Data
 Design airflow CFM: 596 CFM
 CFM/ft²: 0.20 CFM/ft²
 CFM/person: 39.38 CFM/person

Air System Information
 Air System Name: RTU-5
 Equipment Class: PKG ROOF
 Air System Type: SZCAV
 Number of zones: 1
 Floor Area: 3027.0 ft²
 Location: Portland, Maine

Sizing Calculation Information
 Calculation Months: Jan to Dec
 Sizing Data: Calculated
 Zone CFM Sizing: Peak zone sensible load
 Space CFM Sizing: Coincident 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	741	741	0.24	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	15.2	Jan 1900	0.0	3027.0

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 (ft ²)	Space CFM/ft ²
Zone 1							
STOCKROOM	1	15.2	Jan 1900	741	0.0	3027.0	0.24

1. Summary
 Ventilation Sizing Method: ASHRAE Std 62.1-2010
 Design Condition: Heating operation
 Occupant Diversity (D): 1.000
 Unconnected Outdoor Air Intake (Vou): 477 CFM
 System Ventilation Efficiency (Ev): 1.000
 Outdoor Air Intake (Vot): 596 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Supply Air (CFM)	Space Floor Area (ft ²)	Area Outdoor Air Rate (CFM/ft ²)	Time Averaged Occupancy (Occupants)	People Outdoor Air Rate (CFM/person)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (CFM)	Breathing Zone Outdoor Air (CFM)	Space Ventilation Efficiency (Evz)
Zone 1										
STOCKROOM	1	741	3027.0	0.12	15.1	7.50	0.80	596	477	1.000
Totals (incl. Space Multipliers)		741						596	477	1.000

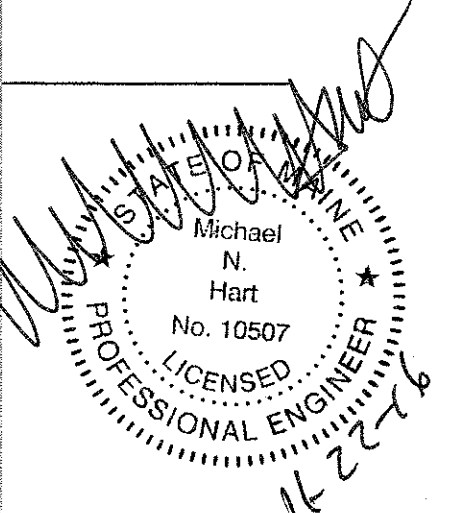
AIR DESIGN LOAD SUMMARY

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500			HEATING DATA AT DES Htg		
	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
ZONE LOADS						
Window & Skylight Solar Loads	1491 ft ²	52851	-	1491 ft ²	-	-
Wall Transmission	3518 ft ²	5588	-	3518 ft ²	22351	-
Roof Transmission	7523 ft ²	13094	-	7523 ft ²	15519	-
Window Transmission	1491 ft ²	3740	-	1491 ft ²	30696	-
Skylight Transmission	0 ft ²	0	-	0 ft ²	0	-
Door Loads	126 ft ²	2075	-	126 ft ²	6319	-
Floor Transmission	3027 ft ²	0	-	3027 ft ²	0	-
Partitions	0 ft ²	0	-	0 ft ²	0	-
Ceiling	0 ft ²	0	-	0 ft ²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	10760 W	33509	-	0	0	-
Electric Equipment	2638 W	8687	-	0	0	-
People	102	17652	20348	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	6000	0	-	0	0
Safety Factor	20% / 0%	28639	0	30%	22466	0
>> Total Zone Loads	-	171836	20348	-	97363	0
Zone Conditioning	-	188620	20348	-	96411	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	8474 CFM	0	-	8474 CFM	0	-
Ventilation Load	4871 CFM	54290	97518	4871 CFM	370500	0
Supply Fan Load	8474 CFM	12564	-	8474 CFM	-12564	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	255473	117866	-	454348	0
Central Cooling Coil	-	255473	117867	-	0	0
Central Heating Coil	-	0	-	-	454348	-
>> Total Conditioning	-	255473	117867	-	454348	0
Key:		Positive values are clg loads		Positive values are htg loads		Negative values are clg loads

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 CHECKED BY: BKK



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ISSUED / REVISED	DATE
PRELIMINARY SET	09/08/16
LL COORDINATION SET	11/08/16
LL/PERMIT SET	11/21/16

HVAC CALCULATIONS

M-004