

Project Name: Press Hotel, Portland, Maine

Architect: Archetype Architects
48 Union Wharf
Portland, Maine 04101

Contractor: Wright Ryan Construction, Inc.
10 Danforth Street
Portland, Maine 04101

Subcontractor: Warren Mechanical, Inc.
P.O. Box 149
Westbrook, Maine 04098-0149

Supplier: AAON, Inc.
2425 South Yukon Avenue
Tulsa, Oklahoma

Manufacturer: AAON

Section: 15610 MUA 1&2

Contractor Review

Architect's Review



(301) 206-9225 WASHINGTON
(301) 497-9610 FAX
(410) 724-3703 BALTIMORE
(410) 724-5999 FAX

9505 BERGER ROAD COLUMBIA, MD 21046

SUBMITTAL

TO: Warren Mechanical, Inc.
Westbrook, ME

PROJECT: PRESS HOTEL
Portland, ME

ENGINEER: Crabtree Engineering

SPECIFICATION: Project # N/A
10/08/2013

DATE: 03/25/2014

We are pleased to submit the following equipment on the above project:

Two (2) AAON Energy Recovery Packaged Water Source Heat Pump Rooftop Units

TAG: MUA-1, MUA-2

Submitted by,

Tom Whiteley
HAVTECH



Unit Rating

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-025-8-0-E79E-3C9:GELC-U0F-DQF-D00-0HACHK1-00-C0000MAX

Tag: MAU-1

(Values do not account for changes described in SPA)

Job Information

Job Name: *The Press Hotel Portland REV7-21-13*
Job Number: *Revised Conditions*
Site Altitude: *0 ft*
Refrigerant: *R-410A*

Static Pressure

External: *1.00 in. wg.*
Evaporator: *0.21 in. wg.*
Filters Clean: *0.08 in. wg.*
Dirt Allowance: *0.35 in. wg.*
Re-Heat Coil: *0.02 in. wg.*

Cooling Section

	Gross	Net
Equivalent Total Capacity:	<i>326.52 MBH</i>	<i>317.70 MBH</i>
Total Capacity:	<i>289.45</i>	<i>280.62 MBH</i>
Sensible Capacity:	<i>155.77</i>	<i>146.95 MBH</i>
Latent Capacity:	<i>133.68 MBH</i>	
HW Total Cooling Capacity:	<i>37.08 MBH</i>	
Mixed Air Temp:	<i>83.74 °F DB</i>	<i>72.04 °F WB</i>
Entering Air Temp:	<i>83.74 °F DB</i>	<i>72.04 °F WB</i>
Lv Air Temp (Coil):	<i>51.00 °F DB</i>	<i>50.82 °F WB</i>
Lv Air Temp (Unit):	<i>52.77 °F DB</i>	<i>51.59 °F WB</i>
Digital Comp. Capacity Ratio:	<i>100%</i>	
Supply Air Fan:	<i>1 x 270D60 @ 3.10 BHP</i>	
SA Fan RPM / Width:	<i>1197 / 3.643"</i>	
Exhaust Air Fan:	<i>1 x RM220AB70 @ 0.45 BHP</i>	
EA Fan RPM / Width:	<i>946 / 3.450"</i>	
Evaporator Coil:	<i>19.9 ft² / 4 Rows / 14 FPI</i>	
Evaporator Face Velocity:	<i>228.6 fpm</i>	
Energy Recovery Wheel:	<i>1 x ERC-5245</i>	

Unit Information

****WEIGHT AND PERFORMANCE DO NOT INCLUDE SPA**

Approx. Op./Ship Weights: *3556 / 3556 lbs. (±5%)*
Supply CFM/ESP: *4540 / 1 in. wg.*
Final-Filter FV / Qty: *217.92 fpm / 6*
Exhaust CFM/ESP/TSP: *1150 / 1.00 / 1.38 in. wg.*
Outside CFM: *4540*
Ambient Temperature: *86 °F DB / 74 °F WB*
Return Temperature: *73 °F DB / 60 °F WB*

Economizer: *0.02 in. wg.*
Heating: *0.12 in. wg.*
Cabinet: *0.02 in. wg.*
Heatwheel: *1.14 in. wg.*
Total: *2.96 in. wg.*

Heating Section(**)

Primary Heat Type: *Heat Pump - Not operational when the indoor coil entering temperature is less than 35.0 °F*

Auxiliary Heat Type: *Nat. Gas Heat*
Heating CFM: *4540*
Total Capacity: *432.0 MBH*
OA Temp: *0.0 °F DB / -1.0 °F WB*
RA Temp: *70.0 °F DB / 53.0 °F WB*
Entering Air Temp: *11.4 °F DB / 10.4 °F WB*
Leaving Air Temp: *99.4 °F DB / 58.3 °F WB*
Input: *540.0 MBH*
Heater Qty: *1*
Consumption: *540.0 MBH*

Fan Temp Rise:

Re-Heat Coil:

Capacity: *118 MBH*
LA DB / WB: *75.00 °F / 60.35 °F*
RH: *42%*

Water Side Performance:

Cooling Flow Rate: *67.5 gpm*
Cooling PD - Heat Exchanger: *9.13 ft*
Cooling PD - Pipe, Valves, etc: *8.1 ft*
Cooling Ent. / Lv. Water Temp: *85 / 96.5 °F*
Heating Flow Rate: *67.5 gpm*
Heating PD - Heat Exchanger: *9.13 ft*
Heating PD - Pipe, Valves, etc: *8.1 ft*
Heating Ent. / Lv. Water Temp: *60 / 49.42 °F*
Glycol %: *40*

Max Operating Pressure : **125 psig**

Rating Information

Application EER @ Op. Conditions: *13.9*



Unit Rating

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RN-025-8-0-E79E-3C9:GELC-U0F-DQF-D00-0HACHK1-00-C0000MAX

Tag: MAU-1

(Values do not account for changes described in SPA)

Job Information

Job Name: *The Press Hotel Portland REV7-21-13*
 Job Number: *Revised Conditions*
 Site Altitude: *0 ft*
 Refrigerant: *R-410A*

Unit Information

****WEIGHT AND PERFORMANCE DO NOT INCLUDE SPA**

Approx. Op./Ship Weights: *3556 / 3556 lbs. (±5%)*
 Supply CFM/ESP: *4540 / 1 in. wg.*
 Final-Filter FV / Qty: *217.92 fpm / 6*
 Exhaust CFM/ESP/TSP: *1150 / 1.00 / 1.38 in. wg.*
 Outside CFM: *4540*
 Ambient Temperature: *86 °F DB / 74 °F WB*
 Return Temperature: *73 °F DB / 60 °F WB*

Electrical Data

Rating: *208/3/60*
 Unit FLA: *122*

Minimum Circuit Amp: *134*
 Maximum Overcurrent: *175*

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	1		208	3			48.1
Compressor 2:	1		208	3			48.1
Supply Fan:	1	5.00	208	3	1760	16.7	
Exhaust Fan:	1	1.00	208	3	1760	4.6	
Combustion:	2	0.25	208	1	3200	1.7	
Heatwheel:	1	0.1667	208	1	1760	1.2	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW(dB):	88	89	89	87	83	85	83	79
Return LW(dB):	81	87	75	69	70	68	64	59

*Sound power levels are given for informational purposes only. The sound levels are not guaranteed.

Application Considerations

You have selected option 2:

You agree to not operate the heat pump when the mixed air temperature is below the 35.00 °F limit.

Verify the performance of this unit by making another selection with the mixed air temperature equal to or higher than the minimum.

The minimum temperature to the indoor coil in heating mode is 35.00°F. This temperature is based on the outdoor dry bulb temperature, indoor air flow rate, water to refrigerant heat exchanger entering water temperature, and water to refrigerant heat exchanger water flow rate. If actual operating conditions are more extreme than those shown on the rating sheet, the unit may have difficulty operating.

AAON strongly recommends that any equipment installed outdoors with water in any piping or heat exchangers be treated with sufficient propylene glycol to prevent any damage from freezing.

(**)Fan motor temperature rise is not included in the heat capacity and temps.



Energy Wheel Rating

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RN-025-8-0-E79E-3C9:GELC-U0F-DQF-D00-0HACHK1-00-C0000MAX

Tag: MAU-1

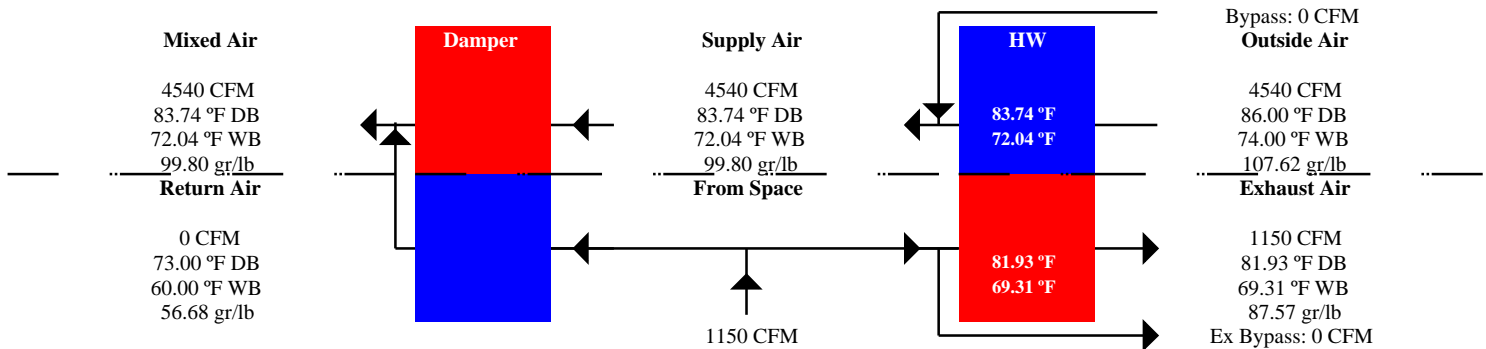
Job Name
Job Number
Site Altitude

The Press Hotel Portla
Revised Conditions
0'

Heat Wheel Type:
Heat Wheel Model:
Heat Wheel Qty:

Total
ERC-5245
1

Summer Conditions



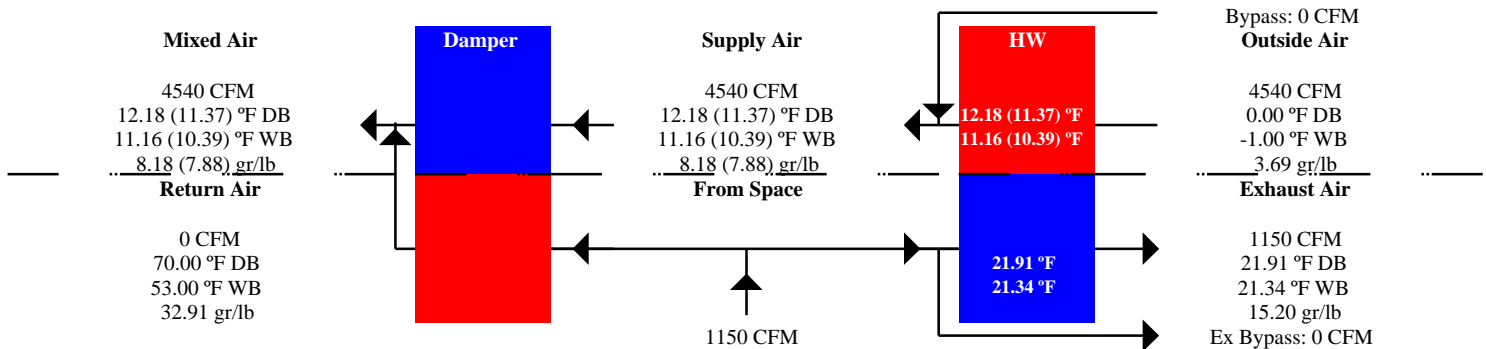
Cooling/Dehumidification

Total Capacity: **37.08 MBH**
Sensible Capacity: **11.37 MBH**
Latent Capacity: **25.71 MBH**

Heating/Humidification

0.00 MBH
0.00 MBH
0.00 MBH

Winter Conditions



Cooling/Dehumidification

Total Capacity: **0.00 (0.00) MBH**
Sensible Capacity: **0.00 (0.00) MBH**
Latent Capacity: **0.00 (0.00) MBH**

Heating/Humidification

72.63 (67.79) MBH
59.69 (55.71) MBH
12.94 (12.07) MBH

() Time Average Performance Due to Heat Wheel Defrost.



27.0" STAR Plenum

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AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

JOB INFORMATION:

Job Name: *The Press Hotel Portland*
 Job Tag: *REV7-21-13*
 Rep Firm: *MAU-1*
 Date: *03/26/2014*

WHEEL SPECIFICATION:

Max RPM: *1,800*
 Diameter x Qty: *27.4 in. x 1*
 Width%: *99*
 Tip Speed: *8,586 FPM*
 Inertia: *16 WR²*

OPERATING CONDITIONS:

Air Flow: *4,540 CFM*
 Static Pressure: *2.96 in. Wg.*
 Plenum DP: *0.00 in. Wg.*
 Inlet Grill DP: *0.00 in. Wg.*
 TSP: *2.96 in. Wg.*
 Site Altitude: *0.00 Ft*
 TSP @ Sea Level: *2.96 in. Wg.*

MOTOR SELECTION:

Rated HP / Bypass: *5 / No*
 Frame Size: *184T*
 Nominal RPM: *1760*
 VAC/PH/Hz: *208/3/60*
 Efficiency: *Premium / 0.895*
 Enclosure Type: *ODP*
 Max Inertial Load: *52 WR²*

FAN PERFORMANCE:

RPM: *1197*
 BHP: *3.10*
 Efficiency: *68.3%*
 In/Out Velocity: *1185/1240 FPM*
 Plenum Out Velocity: *76 FPM*

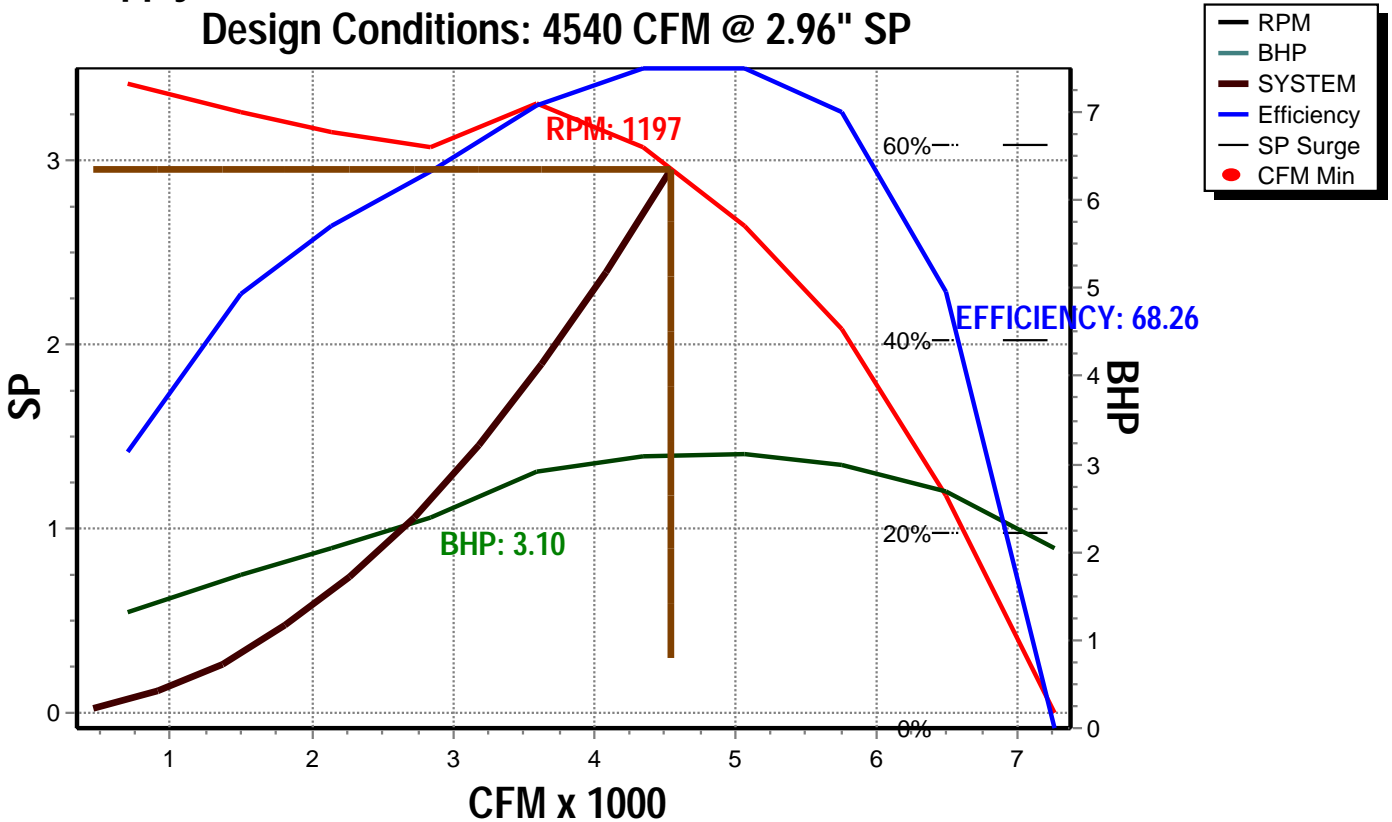
FAN SOUND POWER (Inlet/Outlet):

Octave Band:	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	86	83	81	81	81	80	80	79
	88	88	89	88	86	88	87	83

SOUND POWER A-Weighted: **89 / 94 dB**

Max Duct SP with Blocked Airway: **3.3 in. Wg. @ 1197 rpm**

Supply Fan Model: 270D60 @ 1197 RPM and 99% Width
Design Conditions: 4540 CFM @ 2.96" SP





22.0" STAR Plenum

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

JOB INFORMATION:

Job Name: *The Press Hotel Portland*
 Job Tag: *REV7-21-13*
 Rep Firm: *MAU-1*
 Date: *03/26/2014*

WHEEL SPECIFICATION:

Max RPM: 2,200
 Diameter x Qty: *22.0 in. x 1*
 CFM: 1150
 Tip Speed: 1150
 Inertia: 5,449 FPM
 5 WR²

OPERATING CONDITIONS:

Air Flow: 1,150 CFM
 Static Pressure: 1.27 in. Wg.
 Relief Dampers DP: 0.11 in. Wg.
 TSP: 1.38 in. Wg.
 Site Altitude: 0.00 Ft
 TSP @ Sea Level: 1.38 in. Wg.

MOTOR SELECTION:

Rated HP / Bypass: 1 / No
 Frame Size: 143T
 Nominal RPM: 1760
 VAC/PH/Hz: 208/3/60
 Efficiency: Premium / 0.855
 Enclosure Type: ODP
 Max Inertial Load: 15 WR²

FAN PERFORMANCE:

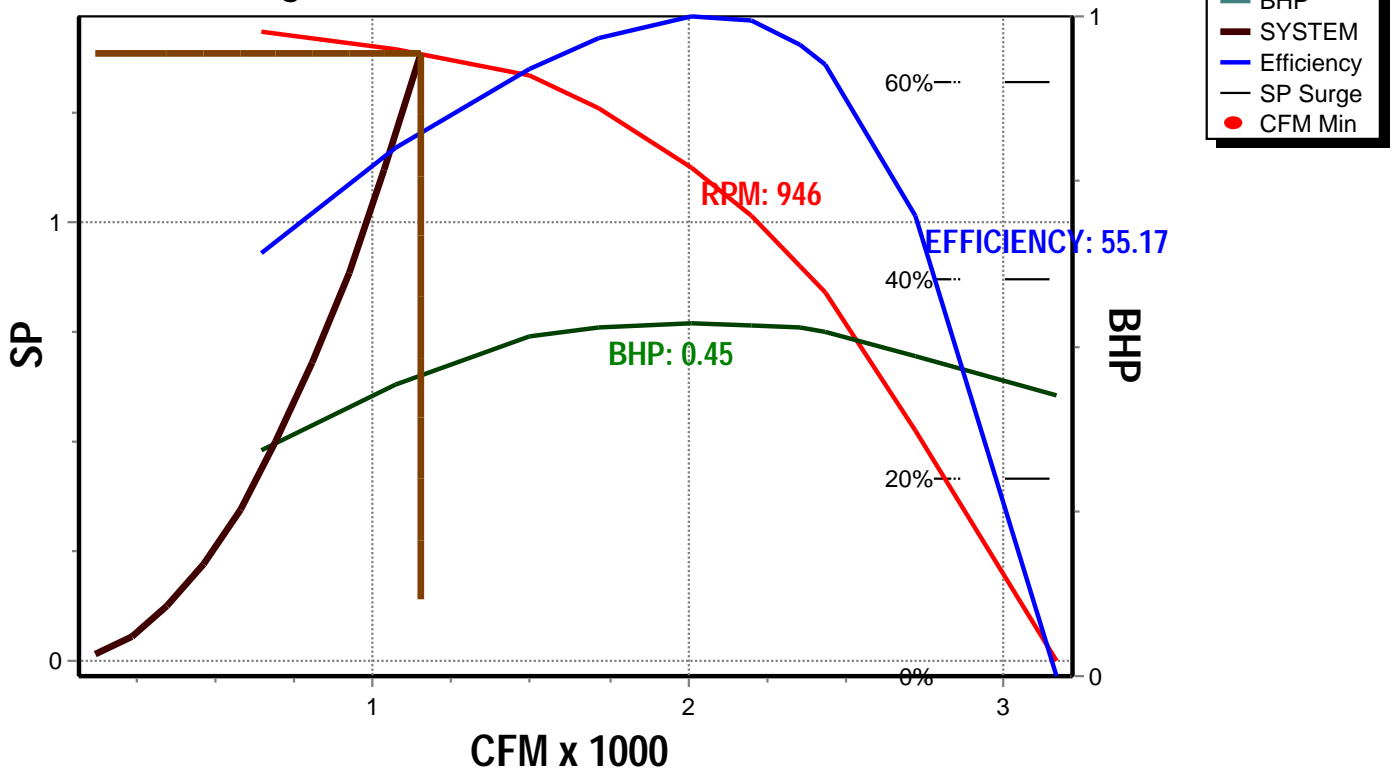
RPM: 946
 BHP: 0.45
 Efficiency: 55.2%
 In/Out Velocity: 352/387 FPM
 Plenum Out Velocity: 19 FPM

FAN SOUND POWER (Inlet/Outlet):

Octave Band:	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	78	87	77	71	68	66	62	56
	78	87	77	71	68	66	62	56

SOUND POWER A-Weighted: 79 / 79 dB

Exhaust Fan Model: RM220AB70 @ 946 RPM and 100% Width Design Conditions: 1150 CFM @ 1.39" SP





Unit Submittal

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RN-025-8-0-E79E-3C9:GELC-U0F-DQF-D00-0HACHK1-00-C0000MAX
Tag: MAU-1

Job Name:
Job Number:

The Press Hotel Portland REV7-21-13
Revised Conditions

Unit Submittal For:
Unit Submittal Date: July 22, 2013

	Base Option	Description
R	Series	Roof Top Unit
N	Generation	Ninth Generation
025	Unit Size	Twenty Five
8	Voltage	208V/3Ø/60Hz
0	Interior Protection	Standard
E	Refrigerant Style	R-410A Variable Capacity Scroll Compressor (VCC)
7	Unit Configuration	Water-Source/Geothermal Heat Pump
9	Coil Coating	Polymer E-Coated Cooling Coil
E	Cooling/Heat Pump Staging	Modulating Heat Pump + 1 Stage Auxiliary Heat - 1 VCC + 1 On/Off Comp.
3	Heating Type	Natural Gas Stainless Steel
C	Heating Designation	Heat C - 540 MBtuH
9	Heating Staging	Modulating Gas - Temperature Control

	Feature Option	Description
G	1A. RA/OA Section	AAONAIRE® Energy Recovery Wheel + Bypass Damper - Total + Low CFM
E	1B. RA/EA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
L	1C. RA/EA Blower	22" Backward Curved Plenum - 70% Width with Banding
C	1D. RA/EA Blower Motor	1.0 hp - 1760 rpm
U	2. OA Control	2 Position Actuator
0	3. Heat Options	Standard - Aux./Emer. Heating Capacity shown in Heating Designation
F	4. Maintenance Options	115V Convenience Outlet - Field Wired + Remote Start/Stop Terminals - LVTB
D	5A. SA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
Q	5B. SA Blower	27" Direct Drive Backward Curved Plenum - 60% Width
F	5C. SA Motor	5.0 hp - 1760 rpm
D	6A. Pre Filter Type	Energy Recovery Wheel 2" Pleated EA Filter - 30% Eff
0	6B. Unit Filter Type	2" Pleated - 30% Eff
0	6C. Filter Options	Standard
0	7. Refrigeration Control	Standard - Fixed 55°F Comp. Cooling Lock Out + Adjustable Comp. Heating Lock Out
H	8. Refrigeration Options	HGB Lag + MHGR
A	9. Refrigeration Accessories	Sight Glass
C	10. Power Options	Power Switch - 225 amps
H	11. Safety Options	Remote Safety Shutdown Terminals
K	12. Controls	Phase & Brown Out Protection + ERW Defrost
1	13. Special Controls	Make Up Air Heat Pump Unit Controller - CV Cool + CV Heat
0	14A. Preheat Configuration	Standard - None
0	14B. Preheat Sizing	Standard - None
C	15. Glycol Percent	Field Adjustable Glycol Percentage
0	16. Interior Cabinet Options	Standard - Double Wall + R-13 Foam Insulation + Stainless Steel Drain Pan
0	17. Exterior Cabinet Options	Standard
0	18. Customer Code	Standard
0	19. Code Options	Standard - ETL U.S.A. Listing
0	20. Crating	Standard
M	21. Water-Cooled Cond.	Balancing Valves + Water Flow Switch + Head Pressure Control
A	22. Control Vendors	Wattmaster Controls
X	23. Type	Special Price Authorization + AAON Gray Paint



VCMX Components

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Tag: MAU-1

Job Name:

The Press Hotel Portland VCMX For:
REV7-21-13

Job Number:

Revised Conditions

VCMX Date:

July 22, 2013

Hardware Included For VCMX Controller

Part #	Included Parts	Assigned Channel
V07140	VCMX Controller with WSHP and EBUS	
R82890	Supply Air Temp Sensor - Field Installed	MainController\AI2
R81550	Outside Air Temp Sensor	MainController\AI4
R69190	VCMX Large Expansion Module	
R37030	Building Static Pressure Sensor	LargeExpansionModule\AI4
P62520	Proof of Flow Sensor	LargeExpansionModule\BI3
R34700	Outside Air Humidity Sensor	LargeExpansionModule\AI1
V18330	WSHP Module	
R28390	Suction Pressure Transducer	
R28390	Suction Pressure Transducer	
R32960	Water Temp Sensor	
R70490	Water Flow Switch	
R90230	VCMX Head Pressure Module	
R22020	Head Pressure Sensor	
R22020	Head Pressure Sensor	

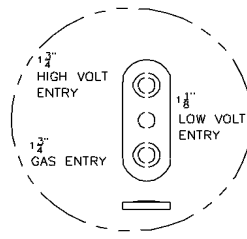
		1	2	3	4	5	6	7
VCMX Controller with WSHP and EBUS	Analog In		X		X			
	Analog Out	X	X					
	Binary In							
	Relay Out	X	X	X	X	X		
	Digital Sensor(s)							

		1	2	3	4	5	6	7	8
VCMX Large Expansion Module	Analog In	X			X				
	Analog Out			X					
	Binary In	X		X	X				
	Relay Out	X	X						

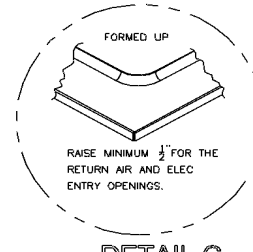
RN SERIES

C - CABINET WATER - COOLED CONDENSER OR CHILLED WATER AIR HANDLER ~ 16 - 30 TON WITH ECONOMIZER, ENERGY RECOVERY SECTION RETURN AIR FILTER AND POWER EXHAUST

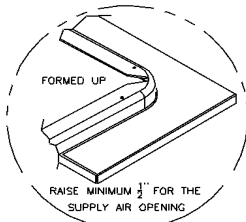
CLEARANCES	
LOCATION	UNIT SIZE
	16 - 30 TON
OUTSIDE AIR (BACK)	48
CONTROLS SIDE (FRONT)	48
LEFT SIDE	48
RIGHT SIDE	60
TOP	UNOBSTRUCTED



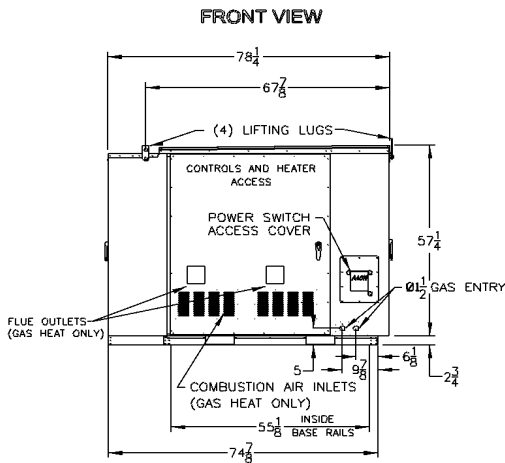
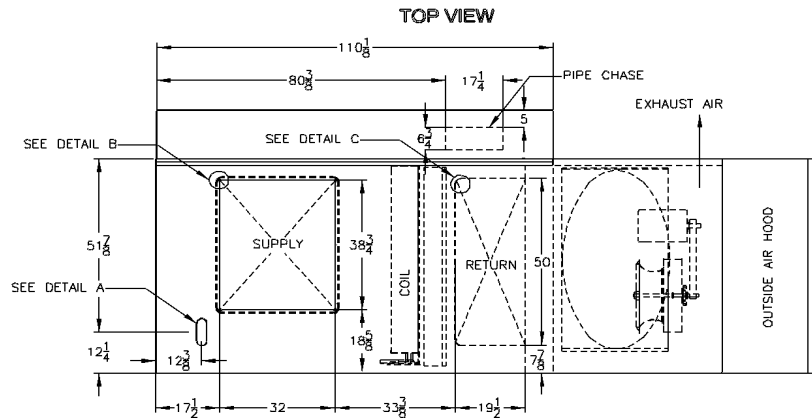
DETAIL A



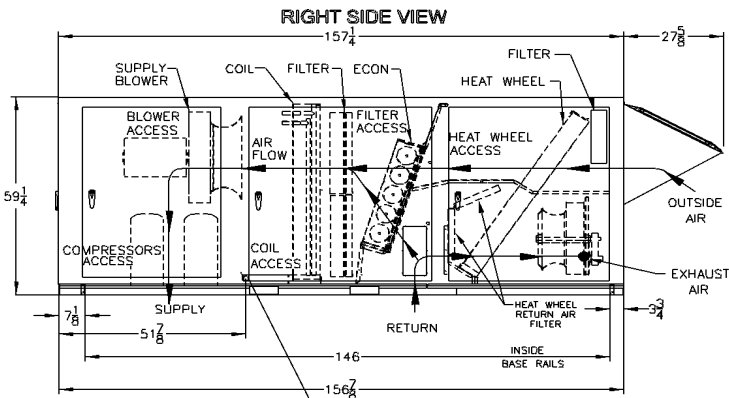
DETAIL C



DETAIL B



RNC-00141 NEW 07/03/12 JRL
NOTE: ALL DIMENSIONS ARE IN INCHES

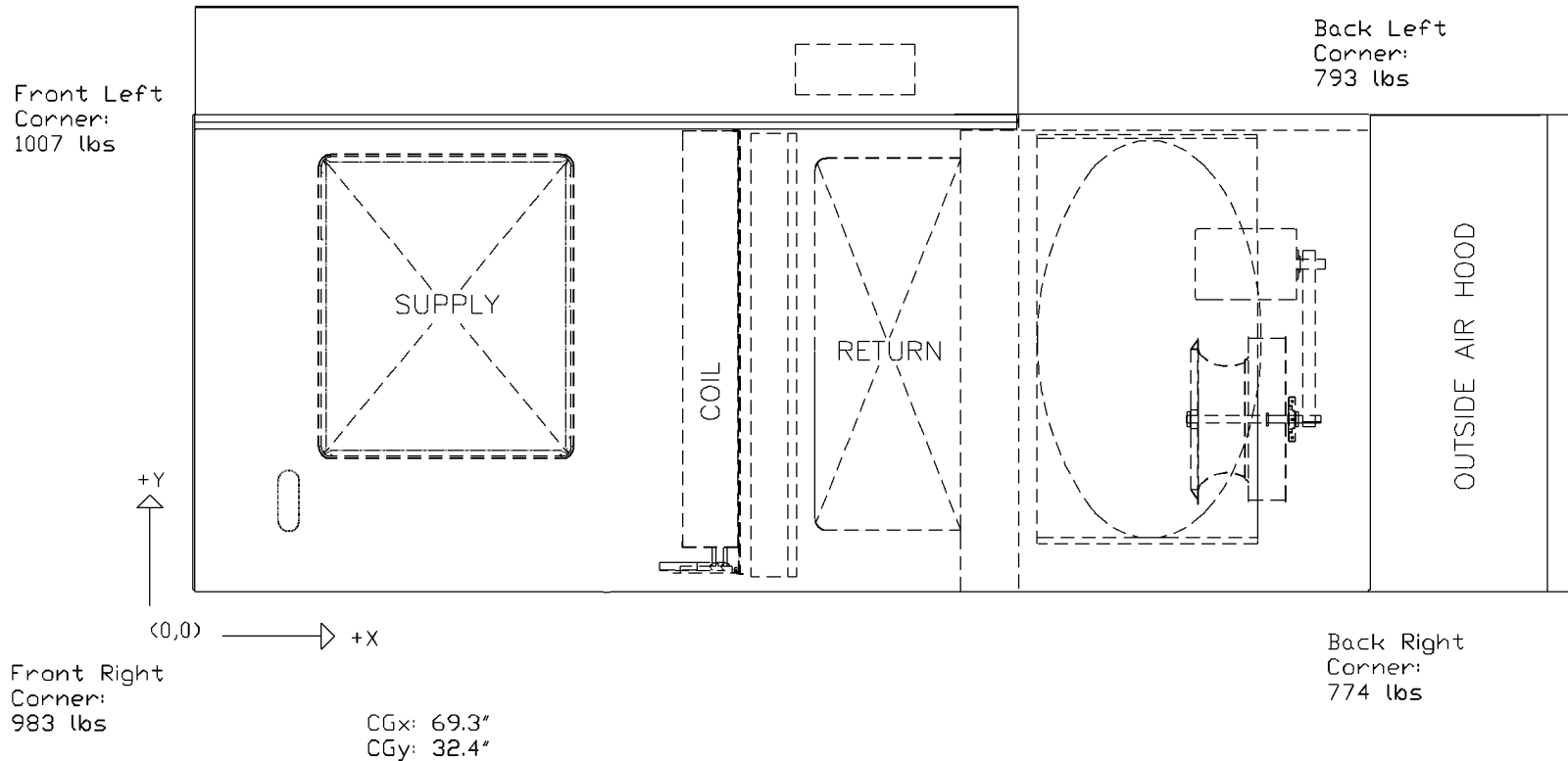


1" MPT STAINLESS CONDENSATE CONNECTION. 'P' TRAP FURNISHED BY MANUFACTURER FOR DRAIN CONNECTION.

RNC CABINET WATER COOLED CONDENSING UNIT OR CHILLED WATER UNIT WITH ENERGY RECOVERY SECTION



RN-025-8-0-E79E-3C9:GELC-U0F-DQF-D00-0HACHK1-00-C00000MAX



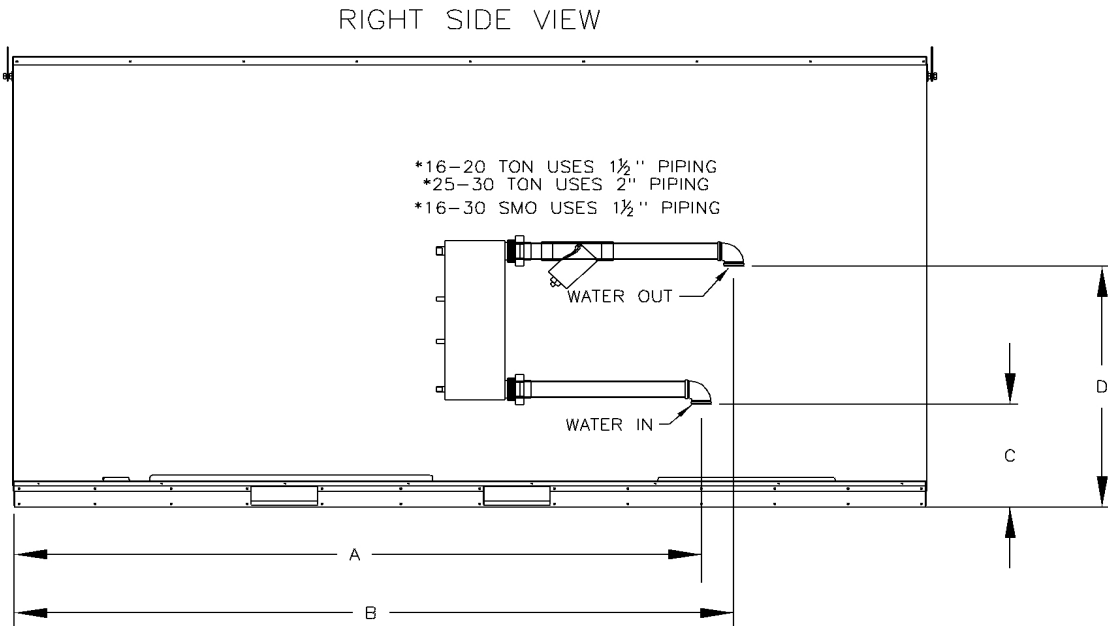
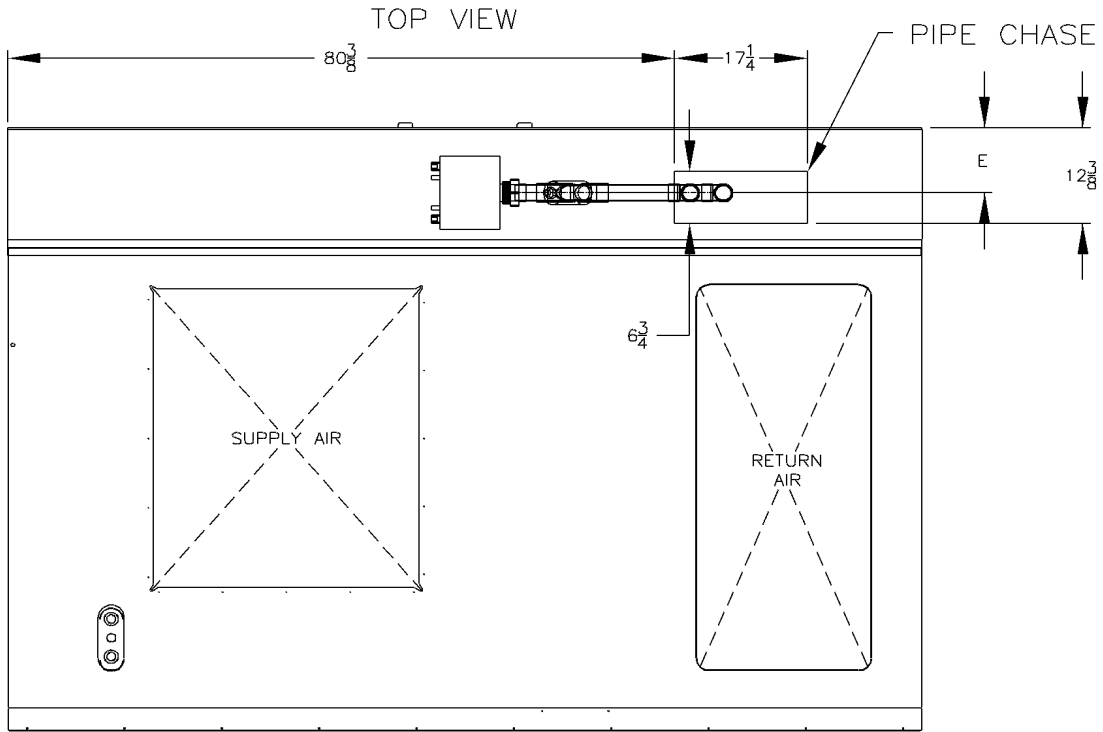
Front Right
Corner:
983 lbs

CGx: 69.3"
CGy: 32.4"

Total Weight:
3556 lbs (±5%)

Disclaimer:
This weight estimate does not account for any SPAs.

RN SERIES C-CABINET
 WATER SOURCE HEAT PUMP PIPING ~16-30 TON



NOTE: ALL DIMENSION ARE +/- 1/2"

RNC-00094 REV:B 02/03/14 JRL
 NOTE: ALL DIMENSIONS ARE IN INCHES

MODEL	A	B	C	D	E
16-30	90 1/2	94	14 3/4	29 1/4	8 3/8
SMO	92 1/2	95 1/4	15 1/2	34 1/4	7 3/8



Unit Rating

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RN-030-8-0-E79E-3C9:GELC-U0F-DRF-D00-0HACHK1-00-C0000MAX
Tag: MAU-2

(Values do not account for changes described in SPA)
Job Information

Job Name: *The Press Hotel Portland REV7-21-13*
Job Number: *Revised Conditions*
Site Altitude: *0 ft*
Refrigerant: *R-410A*

Actual Exhaust is 1010 CFM. Fan is on VFD →

Unit Information

****WEIGHT AND PERFORMANCE DO NOT INCLUDE SPA**

Approx. Op./Ship Weights: *3571 / 3571 lbs. (±5%)*
Supply CFM/ESP: *6005 / 1 in. wg.*
Final-Filter FV / Qty: *288.24 fpm / 6*
Exhaust CFM/ESP/TSP: *1100 / 1.00 / 1.36 in. wg.*
Outside CFM: *6005*
Ambient Temperature: *86 °F DB / 74 °F WB*
Return Temperature: *73 °F DB / 60 °F WB*

Static Pressure

External: *1.00 in. wg.*
Evaporator: *0.32 in. wg.*
Filters Clean: *0.11 in. wg.*
Dirt Allowance: *0.35 in. wg.*
Re-Heat Coil: *0.04 in. wg.*

Economizer: *0.02 in. wg.*
Heating: *0.19 in. wg.*
Cabinet: *0.04 in. wg.*
Heatwheel: *1.27 in. wg.*
Total: *3.33 in. wg.*

Cooling Section

	Gross	Net
Equivalent Total Capacity:	<i>375.23 MBH</i>	<i>361.98 MBH</i>
Total Capacity:	<i>341.09</i>	<i>327.83 MBH</i>
Sensible Capacity:	<i>186.49</i>	<i>173.23 MBH</i>
Latent Capacity:	<i>154.60 MBH</i>	
HW Total Cooling Capacity:	<i>34.14 MBH</i>	
Mixed Air Temp:	<i>84.42 °F DB</i>	<i>72.64 °F WB</i>
Entering Air Temp:	<i>84.42 °F DB</i>	<i>72.64 °F WB</i>
Lv Air Temp (Coil):	<i>54.77 °F DB</i>	<i>54.50 °F WB</i>
Lv Air Temp (Unit):	<i>56.79 °F DB</i>	<i>55.31 °F WB</i>
Digital Comp. Capacity Ratio:	<i>100%</i>	
Supply Air Fan:	<i>1 x 220 @ 4.66 BHP</i>	
SA Fan RPM / Width:	<i>1660 / 4.871"</i>	
Exhaust Air Fan:	<i>1 x RM220AB70 @ 0.44 BHP</i>	
EA Fan RPM / Width:	<i>936 / 3.450"</i>	
Evaporator Coil:	<i>19.9 ft² / 4 Rows / 14 FPI</i>	
Evaporator Face Velocity:	<i>302.3 fpm</i>	
Energy Recovery Wheel:	<i>1 x ERC-5245</i>	

Heating Section()**

Primary Heat Type: *Heat Pump - Not operational when the indoor coil entering temperature is less than 35.0 °F*

Auxiliary Heat Type: *Nat. Gas Heat*

Heating CFM: *6005*
Total Capacity: *432.0 MBH*
OA Temp: *0.0 °F DB / -1.0 °F WB*
RA Temp: *70.0 °F DB / 53.0 °F WB*
Entering Air Temp: *7.9 °F DB / 7.1 °F WB*
Leaving Air Temp: *74.5 °F DB / 47.6 °F WB*
Input: *540.0 MBH*
Heater Qty: *1*
Consumption: *540.0 MBH*

Fan Temp Rise:

Re-Heat Coil:

Capacity: *131 MBH*
LA DB / WB: *75.00 °F / 62.12 °F*
RH: *49%*

Water Side Performance:

Cooling Flow Rate: *81 gpm*
Cooling PD - Heat Exchanger: *12.68 ft*
Cooling PD - Pipe, Valves, etc: *11.66 ft*
Cooling Ent. / Lv. Water Temp: *85 / 96.4 °F*
Heating Flow Rate: *81 gpm*
Heating PD - Heat Exchanger: *12.68 ft*
Heating PD - Pipe, Valves, etc: *11.66 ft*
Heating Ent. / Lv. Water Temp: *60 / 49.62 °F*
Glycol %: *40*

Max Operating Pressure : **125 psig**

Rating Information

Application EER @ Op. Conditions: *13.3*



Unit Rating

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AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-030-8-0-E79E-3C9:GELC-U0F-DRF-D00-0HACHK1-00-C0000MAX
Tag: MAU-2

(Values do not account for changes described in SPA)
Job Information

Job Name: *The Press Hotel Portland REV7-21-13*
Job Number: *Revised Conditions*
Site Altitude: *0 ft*
Refrigerant: *R-410A*

Unit Information

****WEIGHT AND PERFORMANCE DO NOT INCLUDE SPA**

Approx. Op./Ship Weights: *3571 / 3571 lbs. (±5%)*
Supply CFM/ESP: *6005 / 1 in. wg.*
Final-Filter FV / Qty: *288.24 fpm / 6*
Exhaust CFM/ESP/TSP: *1100 / 1.00 / 1.36 in. wg.*
Outside CFM: *6005*
Ambient Temperature: *86 °F DB / 74 °F WB*
Return Temperature: *73 °F DB / 60 °F WB*

Electrical Data

Rating: *208/3/60*
Unit FLA: *128*

Minimum Circuit Amp: *141*
Maximum Overcurrent: *175*

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	1		208	3			51.3
Compressor 2:	1		208	3			51.3
Supply Fan:	1	5.00	208	3	1760	16.7	
Exhaust Fan:	1	1.00	208	3	1760	4.6	
Combustion:	2	0.25	208	1	3200	1.7	
Heatwheel:	1	0.1667	208	1	1760	1.2	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW(dB):	93	91	94	89	80	79	75	69
Return LW(dB):	86	88	83	74	70	68	63	55

*Sound power levels are given for informational purposes only. The sound levels are not guaranteed.

Application Considerations

You have selected option 2:
You agree to not operate the heat pump when the mixed air temperature is below the 35.00 °F limit.
Verify the performance of this unit by making another selection with the mixed air temperature equal to or higher than the minimum.

The minimum temperature to the indoor coil in heating mode is 35.00°F. This temperature is based on the outdoor dry bulb temperature, indoor air flow rate, water to refrigerant heat exchanger entering water temperature, and water to refrigerant heat exchanger water flow rate. If actual operating conditions are more extreme than those shown on the rating sheet, the unit may have difficulty operating.

AAON strongly recommends that any equipment installed outdoors with water in any piping or heat exchangers be treated with sufficient propylene glycol to prevent any damage from freezing.

(**)Fan motor temperature rise is not included in the heat capacity and temps.



Energy Wheel Rating

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1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-030-8-0-E79E-3C9:GELC-U0F-DRF-D00-0HACHK1-00-C00000MAX

Tag: MAU-2

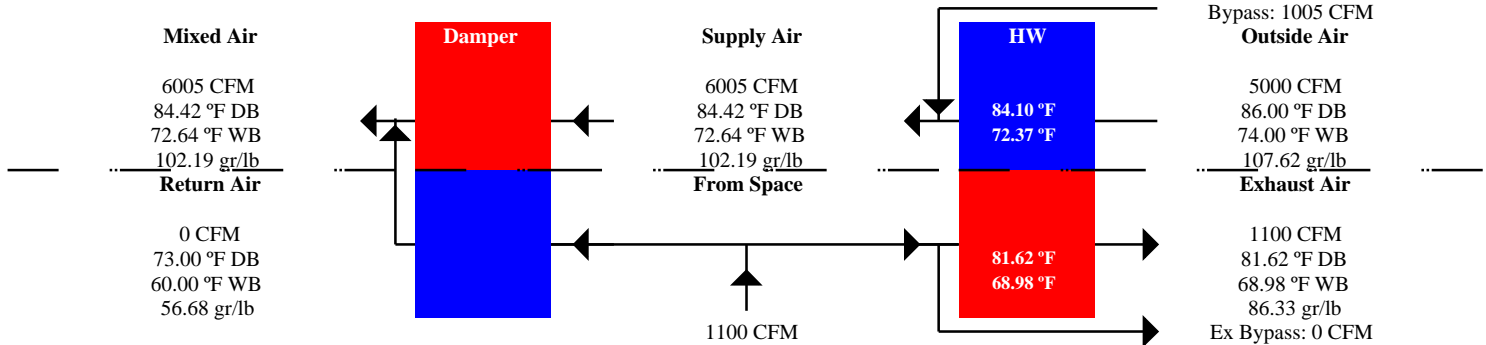
Job Name
Job Number
Site Altitude

The Press Hotel Portla
Revised Conditions
0'

Heat Wheel Type:
Heat Wheel Model:
Heat Wheel Qty:

Total
ERC-5245
1

Summer Conditions



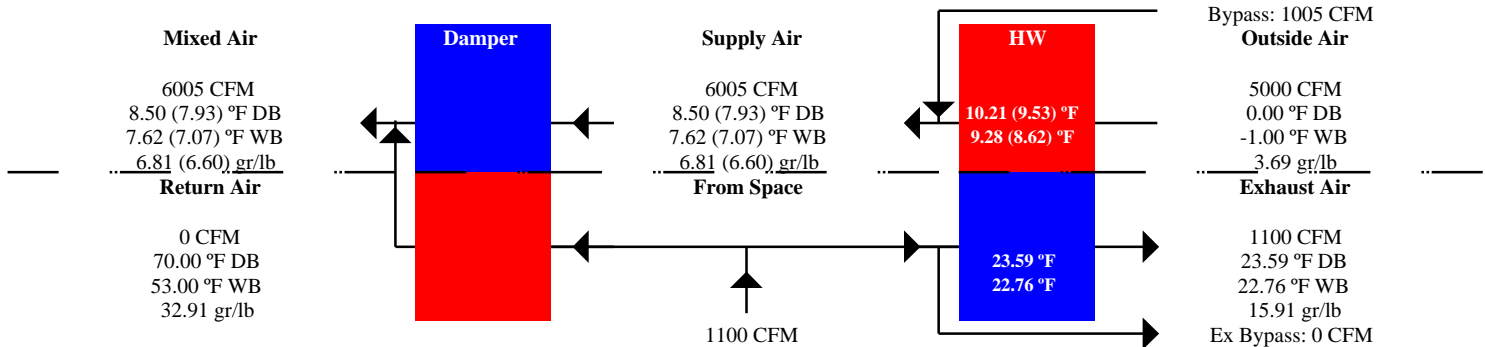
Cooling/Dehumidification

Total Capacity: **34.14 MBH**
Sensible Capacity: **10.50 MBH**
Latent Capacity: **23.64 MBH**

Heating/Humidification

0.00 MBH
0.00 MBH
0.00 MBH

Winter Conditions



Cooling/Dehumidification

Total Capacity: **0.00 (0.00) MBH**
Sensible Capacity: **0.00 (0.00) MBH**
Latent Capacity: **0.00 (0.00) MBH**

Heating/Humidification

66.94 (62.47) MBH
55.10 (51.43) MBH
11.84 (11.05) MBH

() Time Average Performance Due to Heat Wheel Defrost.



22.0" STAR Plenum

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

JOB INFORMATION:

Job Name: *The Press Hotel Portland*
 Job Tag: *REV7-21-13*
 Rep Firm: *MAU-2*
 Date: *03/26/2014*

WHEEL SPECIFICATION:

Max RPM: 2,200
 Diameter x Qty: *22.0 in. x 1*
 Width%: 99
 Tip Speed: 9,561 FPM
 Inertia: 5 WR²

OPERATING CONDITIONS:

Air Flow: 6,005 CFM
 Static Pressure: 3.33 in. Wg.
 Plenum DP: 0.00 in. Wg.
 Inlet Grill DP: 0.00 in. Wg.
 TSP: 3.33 in. Wg.
 Site Altitude: 0.00 Ft
 TSP @ Sea Level: 3.33 in. Wg.

MOTOR SELECTION:

Rated HP / Bypass: 5 / No
 Frame Size: 184T
 Nominal RPM: 1760
 VAC/PH/Hz: 208/3/60
 Efficiency: Premium / 0.895
 Enclosure Type: ODP
 Max Inertial Load: 52 WR²

FAN PERFORMANCE:

RPM: 1660
 BHP: 4.66
 Efficiency: 67.6%
 In/Out Velocity: 1836/2022 FPM
 Plenum Out Velocity: 100 FPM

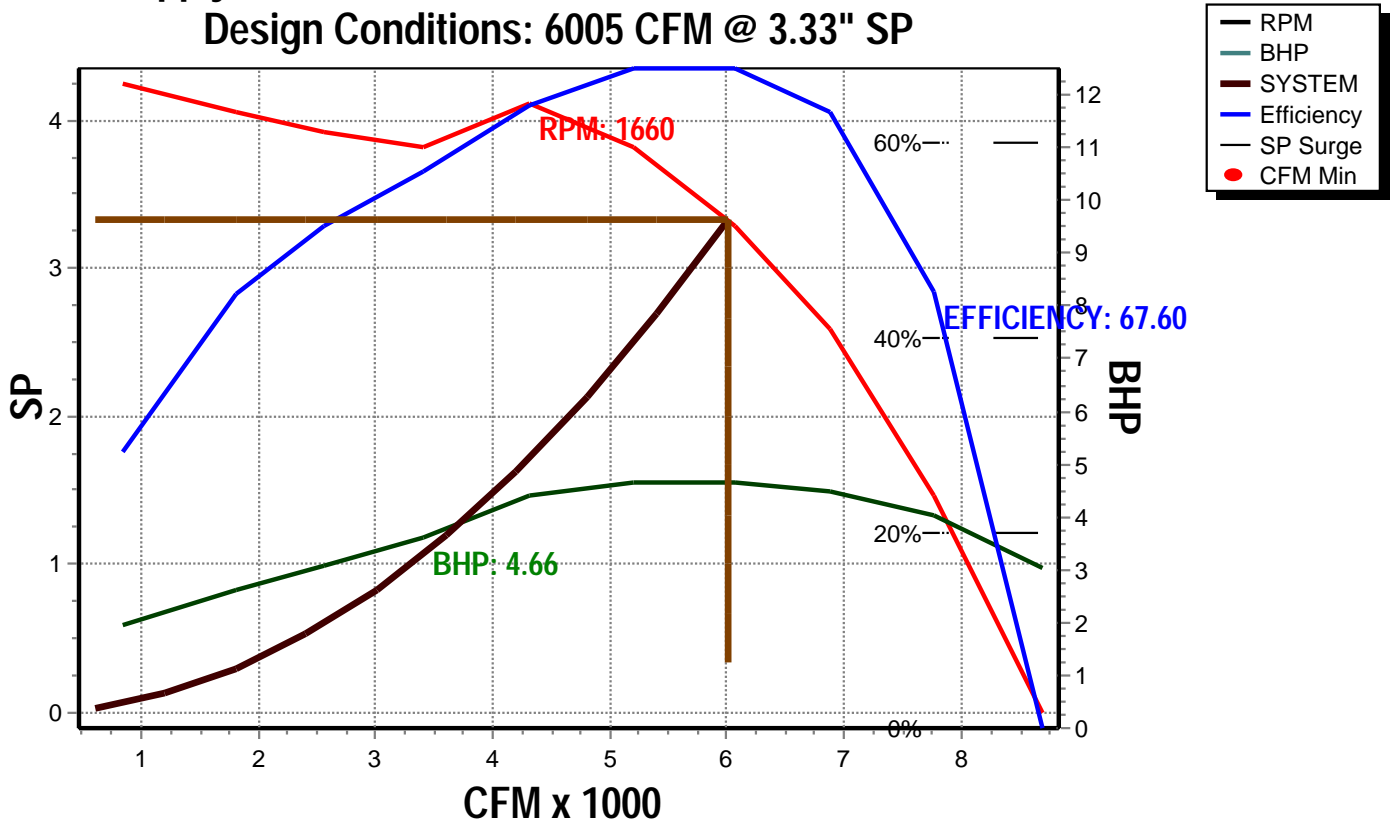
FAN SOUND POWER (Inlet/Outlet):

Octave Band:	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	93	90	94	90	83	82	79	73
	93	90	94	90	83	82	79	73

SOUND POWER A-Weighted: 94 / 94 dB

Max Duct SP with Blocked Airway: 4.1 in. Wg. @ 1660 rpm

Supply Fan Model: 220 @ 1660 RPM and 99% Width
 Design Conditions: 6005 CFM @ 3.33" SP





22.0" STAR Plenum

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AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

JOB INFORMATION:

Job Name: *The Press Hotel Portland*
 Job Tag: *REV7-21-13*
 Rep Firm: *MAU-2*
 Date: *03/26/2014*

WHEEL SPECIFICATION:

Max RPM: 2,200
 Diameter x Qty: *22.0 in. x 1*
 CFM: 1100
 Tip Speed: 1100
 Inertia: 5,391 FPM
 5 WR²

OPERATING CONDITIONS:

Air Flow: 1,100 CFM
 Static Pressure: 1.25 in. Wg.
 Relief Dampers DP: 0.11 in. Wg.
 TSP: 1.36 in. Wg.
 Site Altitude: 0.00 Ft
 TSP @ Sea Level: 1.36 in. Wg.

MOTOR SELECTION:

Rated HP / Bypass: 1 / No
 Frame Size: 143T
 Nominal RPM: 1760
 VAC/PH/Hz: 208/3/60
 Efficiency: Premium / 0.855
 Enclosure Type: ODP
 Max Inertial Load: 15 WR²

FAN PERFORMANCE:

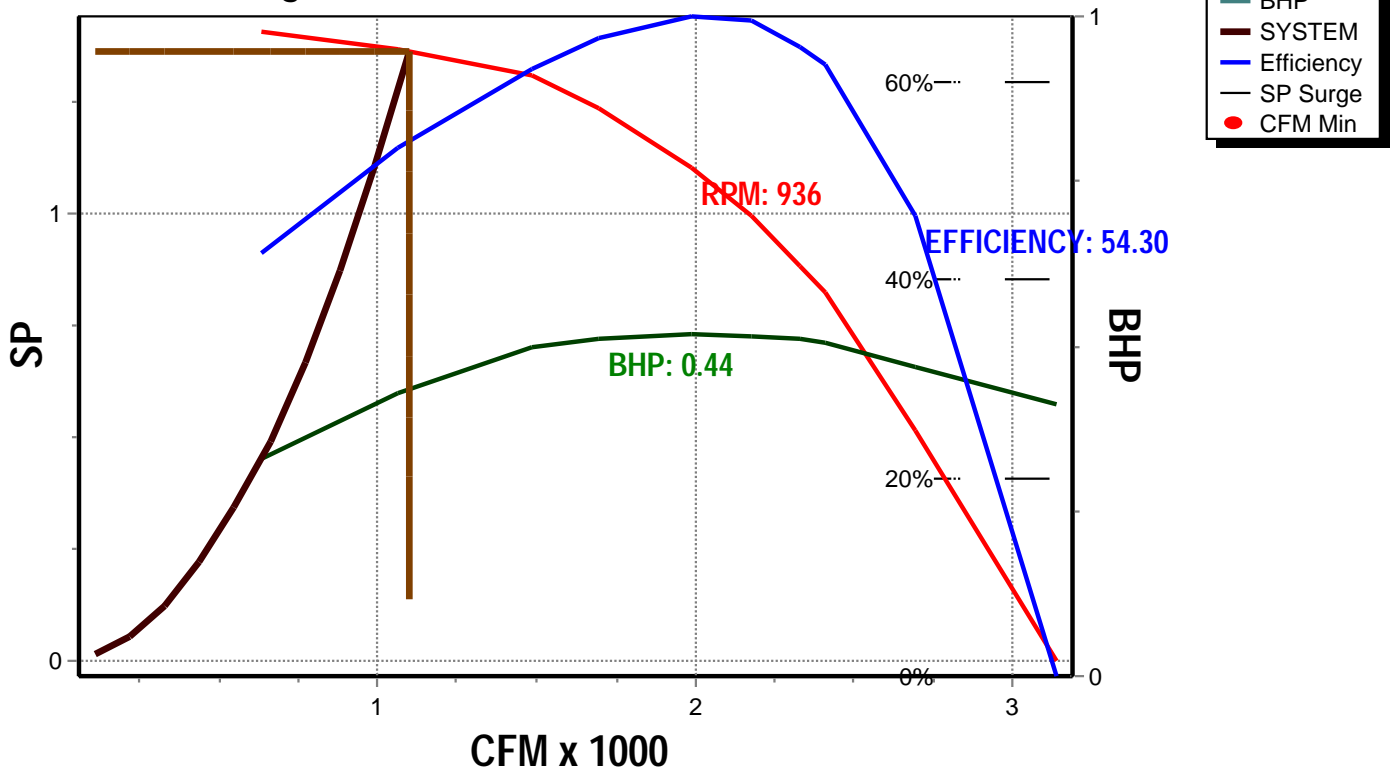
RPM: 936
 BHP: 0.44
 Efficiency: 54.3%
 In/Out Velocity: 336/370 FPM
 Plenum Out Velocity: 18 FPM

FAN SOUND POWER (Inlet/Outlet):

Octave Band:	(Re 10 ⁻¹² watts)							
	1	2	3	4	5	6	7	8
	78	88	77	71	68	66	62	56
	78	88	77	71	68	66	62	56

SOUND POWER A-Weighted: 79 / 79 dB

Exhaust Fan Model: RM220AB70 @ 936 RPM and 100% Width Design Conditions: 1100 CFM @ 1.36" SP





Unit Submittal

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AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-030-8-0-E79E-3C9:GELC-U0F-DRF-D00-0HACHK1-00-C00000MAX
Tag: MAU-2

Job Name:
Job Number:

The Press Hotel Portland REV7-21-13
Revised Conditions

Unit Submittal For:
Unit Submittal Date: July 22, 2013

	Base Option	Description
R	Series	Roof Top Unit
N	Generation	Ninth Generation
030	Unit Size	Thirty
8	Voltage	208V/3Ø/60Hz
0	Interior Protection	Standard
E	Refrigerant Style	R-410A Variable Capacity Scroll Compressor (VCC)
7	Unit Configuration	Water-Source/Geothermal Heat Pump
9	Coil Coating	Polymer E-Coated Cooling Coil
E	Cooling/Heat Pump Staging	Modulating Heat Pump + 1 Stage Auxiliary Heat - 1 VCC + 1 On/Off Comp.
3	Heating Type	Natural Gas Stainless Steel
C	Heating Designation	Heat C - 540 MBtuh
9	Heating Staging	Modulating Gas - Temperature Control

	Feature Option	Description
G	1A. RA/OA Section	AAONAIRE® Energy Recovery Wheel + Bypass Damper - Total + Low CFM
E	1B. RA/EA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
L	1C. RA/EA Blower	22" Backward Curved Plenum - 70% Width with Banding
C	1D. RA/EA Blower Motor	1.0 hp - 1760 rpm
U	2. OA Control	2 Position Actuator
0	3. Heat Options	Standard - Aux./Emer. Heating Capacity shown in Heating Designation
F	4. Maintenance Options	115V Convenience Outlet - Field Wired + Remote Start/Stop Terminals - LVTB
D	5A. SA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
R	5B. SA Blower	22" Direct Drive Backward Curved Plenum
F	5C. SA Motor	5.0 hp - 1760 rpm
D	6A. Pre Filter Type	Energy Recovery Wheel 2" Pleated EA Filter - 30% Eff
0	6B. Unit Filter Type	2" Pleated - 30% Eff
0	6C. Filter Options	Standard
0	7. Refrigeration Control	Standard - Fixed 55°F Comp. Cooling Lock Out + Adjustable Comp. Heating Lock Out
H	8. Refrigeration Options	HGB Lag + MHGR
A	9. Refrigeration Accessories	Sight Glass
C	10. Power Options	Power Switch - 225 amps
H	11. Safety Options	Remote Safety Shutdown Terminals
K	12. Controls	Phase & Brown Out Protection + ERW Defrost
1	13. Special Controls	Make Up Air Heat Pump Unit Controller - CV Cool + CV Heat
0	14A. Preheat Configuration	Standard - None
0	14B. Preheat Sizing	Standard - None
C	15. Glycol Percent	Field Adjustable Glycol Percentage
0	16. Interior Cabinet Options	Standard - Double Wall + R-13 Foam Insulation + Stainless Steel Drain Pan
0	17. Exterior Cabinet Options	Standard
0	18. Customer Code	Standard
0	19. Code Options	Standard - ETL U.S.A. Listing
0	20. Crating	Standard
M	21. Water-Cooled Cond.	Balancing Valves + Water Flow Switch + Head Pressure Control
A	22. Control Vendors	Wattmaster Controls
X	23. Type	Special Price Authorization + AAON Gray Paint



VCMX Components

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AAONEcat32 Ver. 4.215 (SN: 5555616-8QQ87YMY)

1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

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Tag: MAU-2

Job Name:

The Press Hotel Portland VCMX For:
REV7-21-13

Job Number:

Revised Conditions

VCMX Date:

July 22, 2013

Hardware Included For VCMX Controller

Part #	Included Parts	Assigned Channel
V07140	VCMX Controller with WSHP and EBUS	
R82890	Supply Air Temp Sensor - Field Installed	MainController\AI2
R81550	Outside Air Temp Sensor	MainController\AI4
R69190	VCMX Large Expansion Module	
R37030	Building Static Pressure Sensor	LargeExpansionModule\AI4
P62520	Proof of Flow Sensor	LargeExpansionModule\BI3
R34700	Outside Air Humidity Sensor	LargeExpansionModule\AI1
V18330	WSHP Module	
R28390	Suction Pressure Transducer	
R28390	Suction Pressure Transducer	
R32960	Water Temp Sensor	
R70490	Water Flow Switch	
R90230	VCMX Head Pressure Module	
R22020	Head Pressure Sensor	
R22020	Head Pressure Sensor	

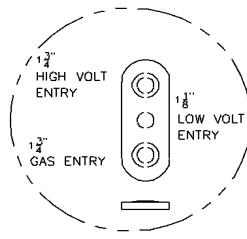
	1	2	3	4	5	6	7
VCMX Controller with WSHP and EBUS	Analog In		X		X		
	Analog Out	X	X				
	Binary In						
	Relay Out	X	X	X	X	X	
	Digital Sensor(s)						

	1	2	3	4	5	6	7	8
VCMX Large Expansion Module	Analog In	X			X			
	Analog Out			X				
	Binary In	X		X	X			
	Relay Out	X	X					

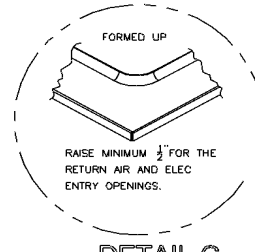
RN SERIES

C - CABINET WATER - COOLED CONDENSER OR CHILLED WATER AIR HANDLER ~ 16 - 30 TON WITH ECONOMIZER, ENERGY RECOVERY SECTION RETURN AIR FILTER AND POWER EXHAUST

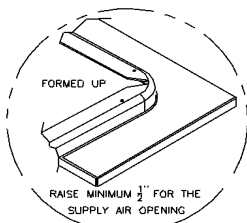
CLEARANCES	
LOCATION	UNIT SIZE
	16 - 30 TON
OUTSIDE AIR (BACK)	48
CONTROLS SIDE (FRONT)	48
LEFT SIDE	48
RIGHT SIDE	60
TOP	UNOBSTRUCTED



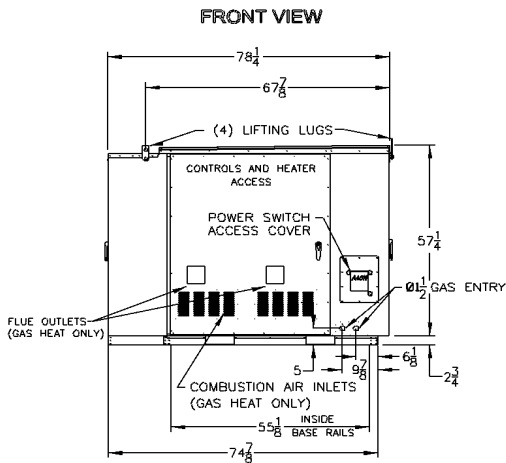
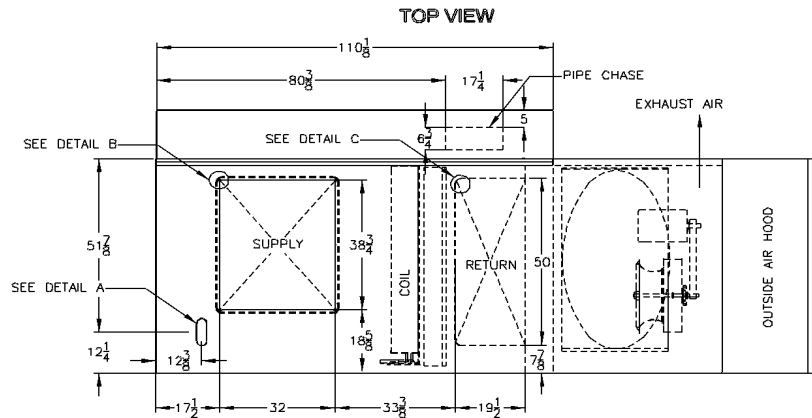
DETAIL A



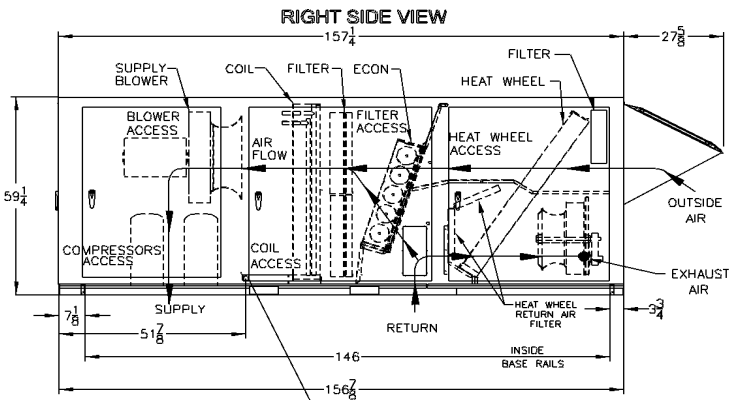
DETAIL C



DETAIL B



RNC-00141 NEW 07/03/12 JRL
NOTE: ALL DIMENSIONS ARE IN INCHES

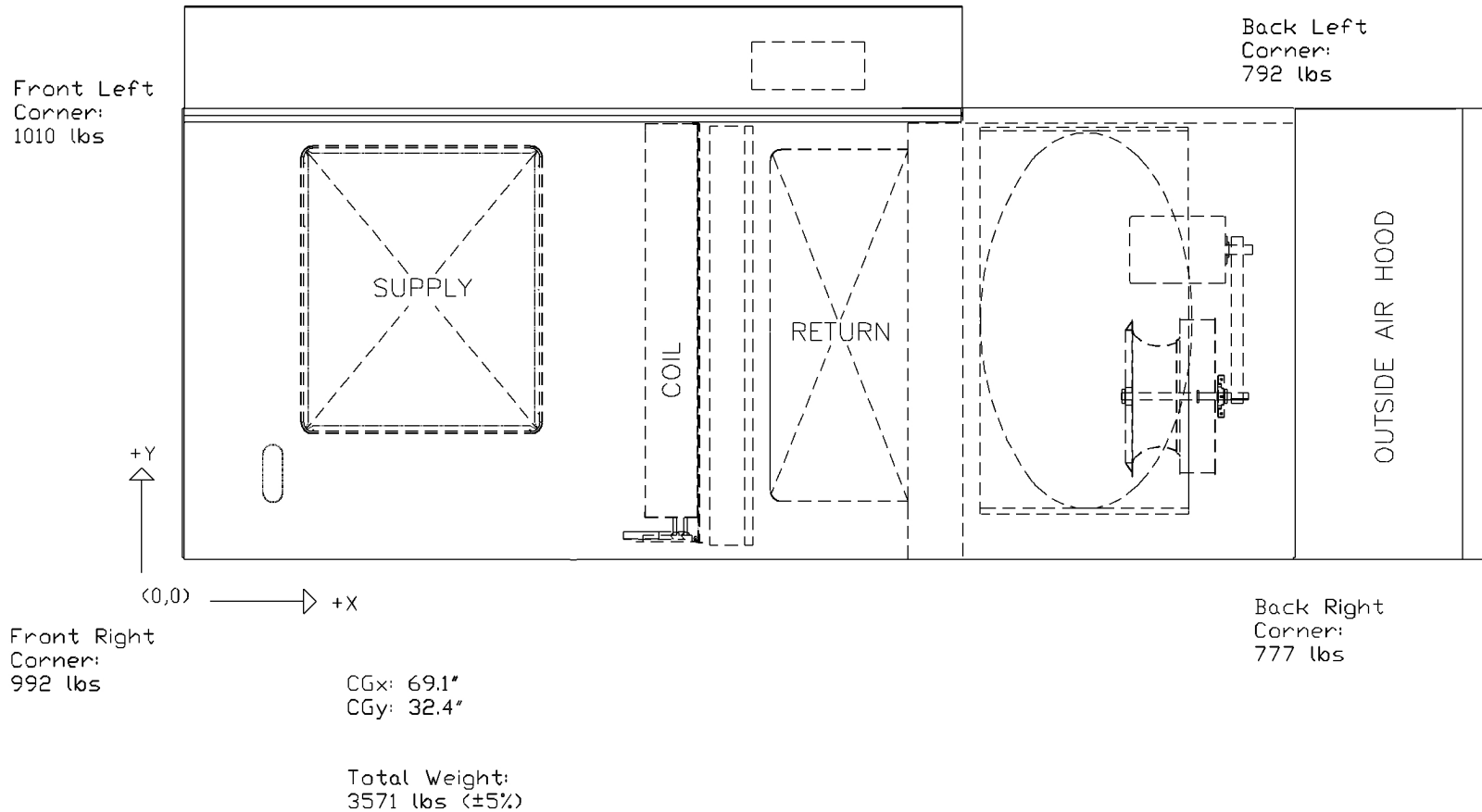


1" MPT STAINLESS CONDENSATE CONNECTION. 'P' TRAP FURNISHED BY MANUFACTURER FOR DRAIN CONNECTION.

RNC CABINET WATER COOLED CONDENSING UNIT OR CHILLED WATER UNIT WITH ENERGY RECOVERY SECTION

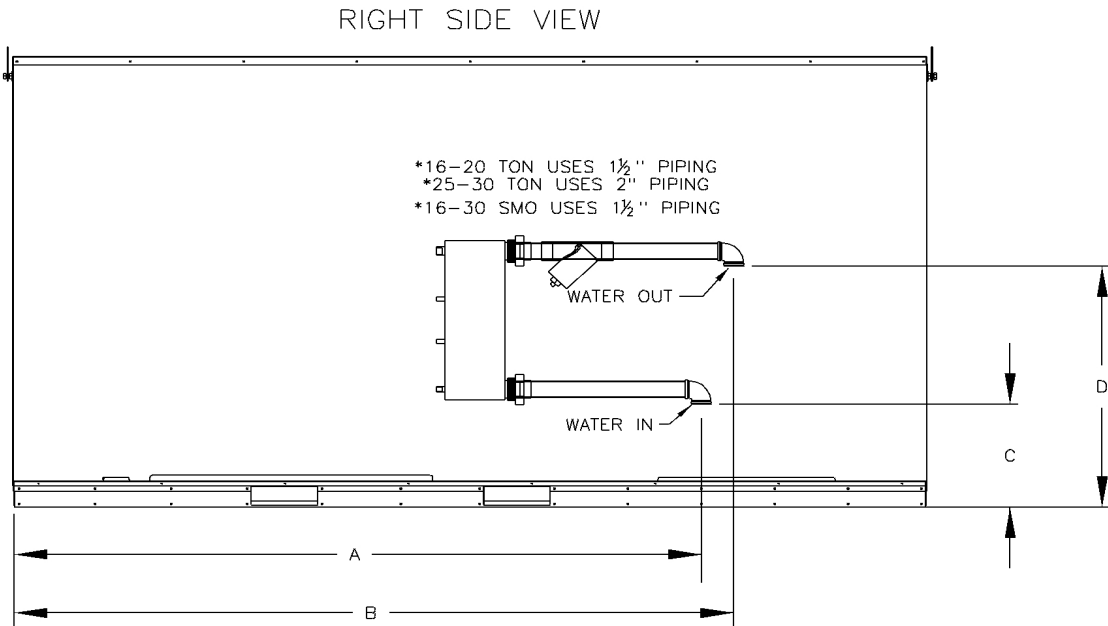
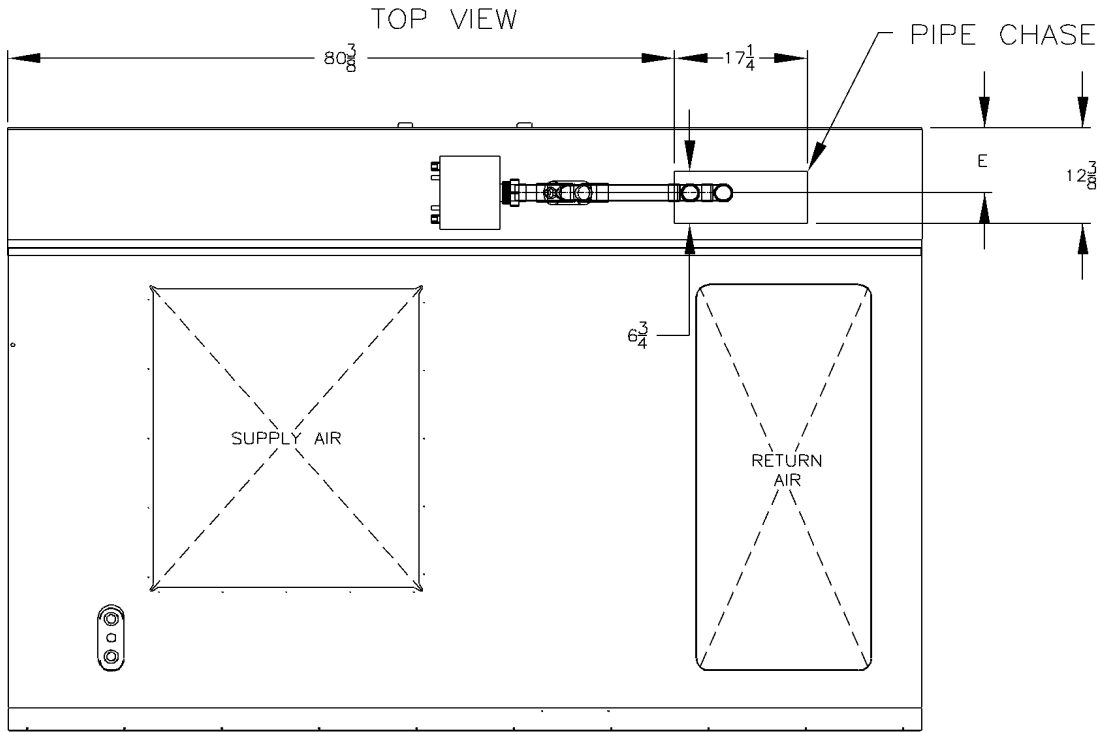


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Disclaimer:
This weight estimate does not account for any SPAs.

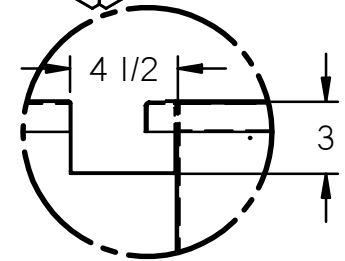
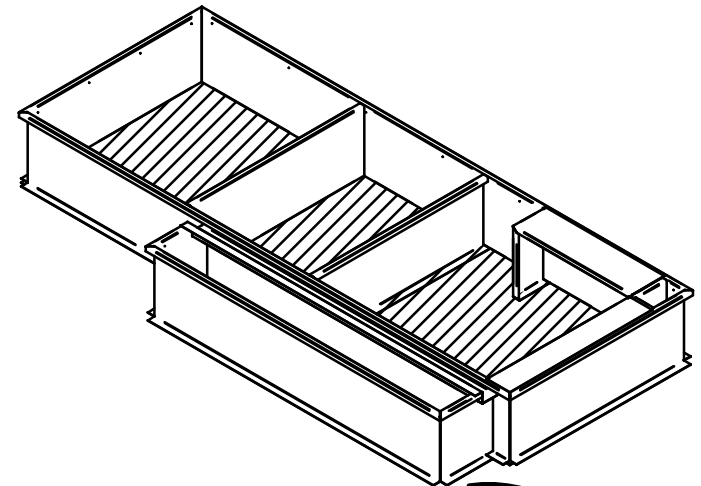
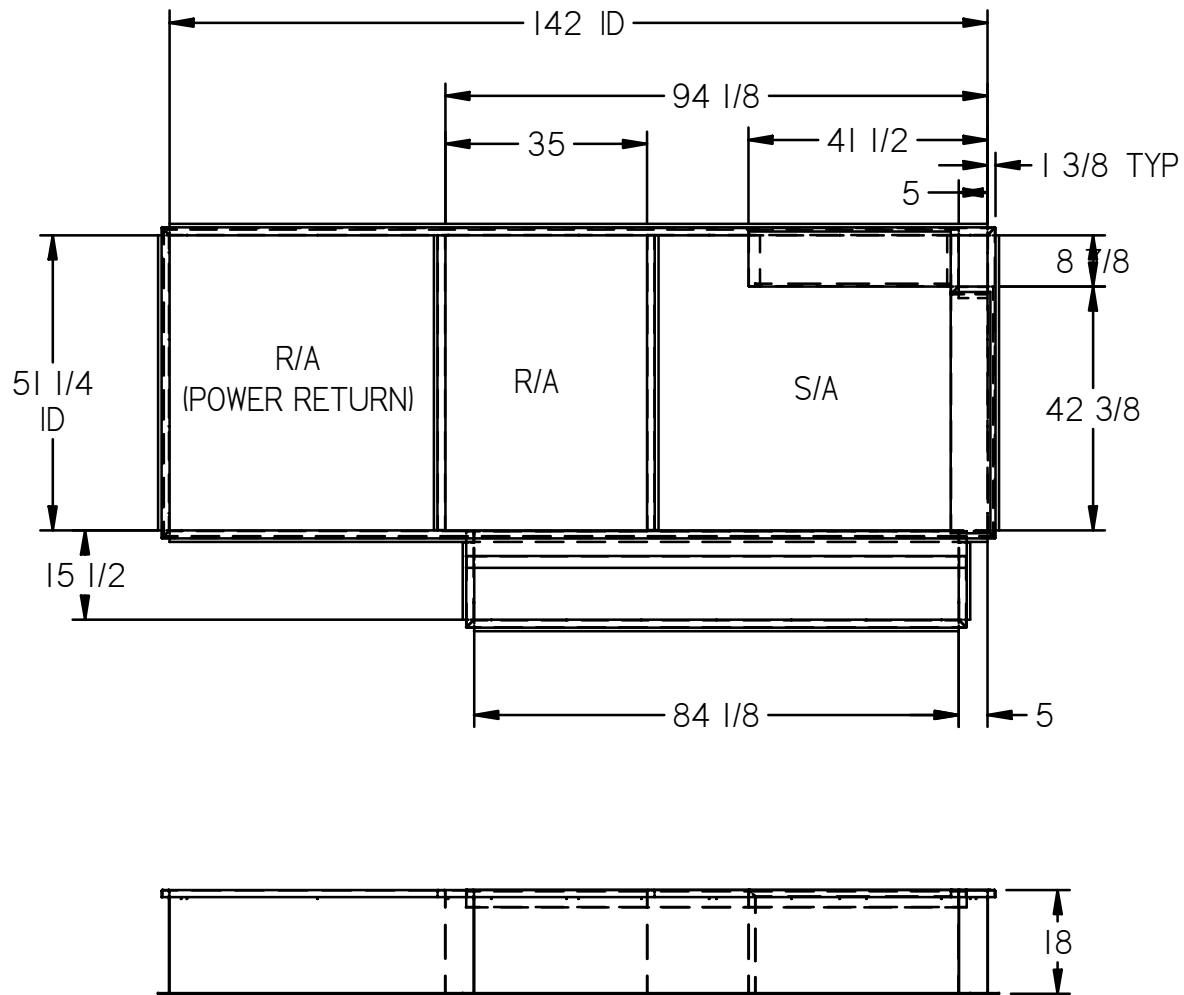
RN SERIES C-CABINET
 WATER SOURCE HEAT PUMP PIPING ~16-30 TON



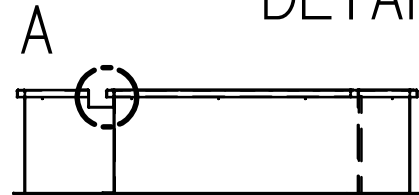
NOTE: ALL DIMENSION ARE $\pm \frac{1}{2}$ "

RNC-00094 REV:B 02/03/14 JRL
 NOTE: ALL DIMENSIONS ARE IN INCHES

MODEL	A	B	C	D	E
16-30	90 1/2	94	14 3/4	29 1/4	8 3/8
SMO	92 1/2	95 1/4	15 1/2	34 1/4	7 3/8



DETAIL A



NOTES:

1. CURB SHIPPED FULLY WELDED, ONE PIECE
2. CURB MUST BE INSTALLED SQUARE AND LEVEL
3. CURB MATERIAL IS 18ga GALVANIZED, NOT PAINTED
4. CURB EQUIPED WITH FACTORY INSTALLED 1x4 PRESSURE TREATED WOOD NAILER
5. CURB SUPPLIED WITH 1-1/2" x 1/4" CLOSED CELL NEOPRENE GASKET
6. INTERIOR OF SUPPLY AND RETURN PLENUM INSULATED WITH 1" - 1.5# DENSITY INSULATION.

APPROX. WEIGHT
450 LBS

CURB TECHNOLOGIES™

QUANTITY: 2
DIMENSIONS: INCHES

PROJECT: Press Hotel (I40325-TGI6)
UNIT TAG:

DRAWN BY TBB

MODEL: RN-C000-SB-094-18

Rev. 00 3/25/14

AAON Model RN Series Rooftop Units

Part 1 - General

1.02 General Description

- A. This section includes the design, controls and installation requirements for packaged rooftop units.

1.03 Quality Assurance

- A. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.
- B. Unit and refrigeration system shall comply with ASHRAE 15, Safety Standard for Mechanical Refrigeration.
- C. Unit shall be certified in accordance with ANSI Z21.47b/CSA 2.3b and ANSI Z83.8/CSA 2.6, Safety Standard Gas-Fired Furnaces.
- D. Unit Energy Efficiency Ratio (EER) shall be equal to or greater that prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
- E. Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.

1.05 Delivery, Storage, and Handling

- A. Unit shall be shipped with doors screwed shut and outside air hood closed to prevent damage during transport and thereafter while in storage awaiting installation.
- B. Follow Installation, Operation, and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.
- C. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation, and Maintenance manual.

1.06 Warranty

- A. Manufacturer shall provide a limited “parts only” warranty for a period of 12 months from the date of equipment startup or 18 months from the date of original equipment shipment from the factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer’s written instructions for Installation, Operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and filters.

Part 2 - Products

2.01 Manufacturer

- A. Products shall be provided by the following manufacturer:
 - 1. AAON
 - a. R-410A refrigerant
 - b. Variable capacity compressor with 10-100% capacity control

- c. Direct drive supply fans
- d. Double wall cabinet construction
- e. Insulation with a minimum R-value of 13
- f. Stainless steel drain pans
- g. Hinged access doors with lockable handles
- h. All other provisions of the specifications must be satisfactorily addressed

2.02 Rooftop Units

A. General Description

1. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, dampers, water-cooled condenser, reheat coil, gas heaters, exhaust fans, energy recovery wheels, and unit controls.
2. Unit shall be factory assembled and tested including leak testing of the DX coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment's literature pocket.
3. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
4. Unit components shall be labeled, including refrigeration system components and electrical and controls components.
5. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
6. Installation, Operation, and Maintenance manual shall be supplied within the unit.
7. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.
8. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

B. Construction

1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel.
4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the

minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.

5. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
6. Access to filters, dampers, cooling coils, reheat coil, heaters, exhaust fans, energy recovery wheels, compressors, water-cooled condensers, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.
7. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
8. Units with cooling coils shall include double sloped 304 stainless steel drain pans.
9. Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.
10. Unit shall include lifting lugs on the top of the unit.

C. Electrical

1. Unit shall be provided with factory installed and factory wired, non-fused disconnect switch.
2. Unit shall be provided with a factory installed and field wired 115V, 20 amp GFI outlet in the unit control panel.
3. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage or on phase reversal.
4. Unit shall be provided with remote stop/start terminals which require contact closure for unit operation. When these contacts are open the low voltage circuit is broken and the unit will not operate.

D. Supply Fans

1. Unit shall include direct drive, unhooded, backward curved, plenum supply fans.
2. Blowers and motors shall be dynamically balance and mounted on rubber isolators.
3. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
4. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

E. Exhaust Fans

1. Exhaust dampers shall be sized for 100% relief.
2. Fans and motors shall be dynamically balanced.
3. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
4. Access to exhaust fans shall be through double wall, hinged access doors with quarter turn lockable handles.
5. Unit shall include belt driven, unhooded, backward curved, plenum exhaust fans.
6. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

F. Cooling Coils

1. Evaporator Coils

- a. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
- b. Coils shall have interlaced circuitry and shall be standard capacity.
- c. Coils shall be hydrogen or helium leak tested.
- d. Coils shall be furnished with factory installed thermostatic expansion valves.
- e. Coils shall have a flexible, epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Humidity and water immersion resistance shall be up to a minimum 1,000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 6,000 hours salt spray per ASTM B117-90. Coated coils shall receive a spray-applied, UV-resistant polyurethane topcoat to prevent UV degradation of the e-coat. Coating shall carry a 5 year warranty, from the date of original equipment shipment from the factory. The first 12 months from the date of equipment startup, or 18 months from the date of original equipment shipment from the factory, whichever is less, shall be covered under the standard AAON limited parts warranty. The remaining period of the warranty shall be covered by Luvata Electrofin. The Luvata Electrofin written instructions for installation, operation, coil cleaning, maintenance, and recording keeping must be followed. Refer to the Luvata Electrofin Terms and Conditions of Sale.

G. Refrigeration System

1. Unit shall be factory charged with R-410A refrigerant.
2. Compressors shall be scroll type with thermal overload protection, independently circuited and carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory.
3. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access

doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.

4. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
5. Each refrigeration circuit shall be equipped with thermostatic expansion valve type refrigerant flow control.
6. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides and a factory installed replaceable core liquid line filter driers.
7. Unit shall include a variable capacity scroll compressor on the lead refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
8. Lead refrigeration circuit shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
9. Unit shall be configured as a water-source heat pump. Each refrigeration circuit shall be equipped with a factory installed liquid line filter drier with check valve, reversing valve, and thermal expansion valves on both the indoor coil and refrigerant-to-water heat exchanger. Reversing valve shall energize during the heat pump heating mode of operation.
10. Each refrigeration circuit shall be equipped with a liquid line sight glass.
11. Lag refrigeration circuit shall be provided with factory installed hot gas bypass to protect against evaporator frosting and to prevent excessive compressor cycling.

H. Condensers

1. Water-Cooled Condenser
 - a. Water-cooled condensing section shall contain plate type, heat exchangers located in an insulated vestibule. Heat exchangers shall be circuited in a counter flow arrangement to the refrigerant system. Plates shall be stainless steel. Each heat exchanger shall be provided with a removable and cleanable type, basket filter on the waterside circuit. Field piping connections shall be made at each plate heat exchanger within the condensing section of the rooftop unit. Maximum operating pressure on the water side of the condenser shall be 125 psi.
 - b. All field installed piping shall be hydrostatically tested before being put into service. Test pressure shall be 125 psi for a 2 hour duration. Leaks and loss in test pressure constitute defects. If test fails, corrections shall be made to the system and the test shall then be repeated to make certain all defects were corrected. All testing shall be performed to ASTM Standards.
 - c. Each heat exchanger circuit shall have a factory installed ball valve for water

balancing

- d. Each heat exchanger circuit shall have a flow switch that shuts down the compressors if water flow to the condenser is interrupted
- e. Unit shall include factory installed head pressure control module and each heat exchanger shall include factory installed head pressure control valve which modulates the condenser water flow based on head pressure and allows cooling operation below 65°F condenser water temperature.

I. Gas Heating

1. Stainless steel heat exchanger furnace shall carry a 25 year non-prorated warranty, from the date of original equipment shipment from the factory.
2. Gas furnace shall consist of stainless steel heat exchangers with multiple concavities, an induced draft blower and an electronic pressure switch to lockout the gas valve until the combustion chamber is purged and combustion airflow is established.
3. Furnace shall include a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.
4. Unit shall include a single gas connection and have gas supply piping entrances in the unit base for through-the-curb gas piping and in the outside cabinet wall for across the roof gas piping.
5. Natural gas furnace shall be equipped with modulating gas valves, adjustable speed combustion blowers, stainless steel tubular heat exchangers, and electronic controller. Combustion blowers and gas valves shall be capable of modulation. Electronic controller includes a factory wired, field installed supply air temperature sensor. Sensor shall be field installed in the supply air ductwork. Supply air temperature setpoint shall be adjustable on the electronic controller within the controls compartment. 90 MBH, 150 MBH, 195 MBH, 210 MBH, 270 MBH, 292.5 MBH, 390 MBH, 540 MBH and 800MBH gas heating assemblies shall be capable of operating at any firing rate between 100% and 30% of their rated capacity. 405 MBH and 810 MBH gas heating assemblies shall be capable of operating at any firing rate between 100% and 20% of their rated capacity. 1080 MBH and 1600 MBH gas heating assembly shall be capable of operating at any firing rate between 100% and 15% of its rated capacity. 2400 MBH gas heating assembly shall be capable of operating at any firing rate between 100% and 10% of its rated capacity.
6. Emergency gas heating capacity shall be sized to meet heating leaving air temperature setpoint when heat pump heating is not in operation.

J. Filters

1. Unit shall include 2 inch thick, pleated panel filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the cooling coil.

K. Outside Air/Economizer

1. Unit shall include 0-100% economizer consisting of a motor operated outside air

damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 cfm of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by spring return actuator. Unit shall include outside air opening bird screen, outside air hood, and barometric relief dampers.

L. Energy Recovery

1. Unit shall contain a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. Frame shall slide out for service and removal from the cabinet.
2. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belt.
3. Wheel shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop-to-efficiency ratios. The layers shall be effectively captured in stainless steel wheel frames or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix.
4. Wheel shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.
5. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.
6. The energy recovery cassette shall be an Underwriters Laboratories Recognized Component for electrical and fire safety. The wheel drive motor shall be an Underwriters Laboratory Recognized Component and shall be mounted in the cassette frame and supplied with a service connector or junction box. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and AHRI Standard 1060, Rating Air-to-Air Energy Recovery Ventilation Equipment. Cassettes shall be listed in the AHRI Certified Products.
7. Energy recovery wheel cassette shall carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory. The first 12 months from the date of equipment startup, or 18 months from the date of original equipment shipment from the factory, whichever is less, shall be covered under the standard AAON limited parts warranty. The remaining period of the warranty shall be covered by Airxchange. The 5 year warranty applies to all parts and components of the cassette, with the exception of the motor, which shall carry an

18 month warranty. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided the Airxchange written instructions for Installation, Operation, and Maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts. Refer to the Airxchange Energy Recovery Cassette Limited Warranty Certificate.

8. Unit shall include 2 inch thick, pleated panel outside air and exhaust air filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the wheels.
9. Hinged service access doors shall allow access to the wheel.
10. Total energy recovery wheels shall be coated with silica gel desiccant permanently bonded by a process without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.
11. Unit shall include energy recovery wheel defrost control which includes an adjustable temperature sensor and timer wired to periodically stop the wheel rotation, which allows the warm exhaust air to defrost the wheel.

M. Controls

1. Factory Installed and Factory Provided Controller
 - a. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Controller shall be capable of stand alone operation with unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling available without dependence on a building management system.
 - b. Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
 - c. Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
- d. Makeup Air Controller
 1. Unit shall modulate cooling with constant airflow to meet ventilation outside air loads. Cooling capacity shall modulate based on supply air temperature.
 2. With modulating hot gas reheat, unit shall modulate cooling and hot gas reheat as efficiently as possible, to meet outside air humidity loads and prevent supply air temperature swings and overcooling of the space.
 3. Unit shall modulate heating with constant airflow to meet ventilation outside air loads. Heating capacity shall modulate based on supply air temperature.

- e. Unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling shall be accomplished with connection to interface module with LCD screen and input keypad, interface module with touch screen, or with connection to PC with free configuration software. Controller shall be capable of connection with other factory installed and factory provided unit controllers with individual unit configuration, setpoint adjustment, sensor status viewing, and occupancy scheduling available from a single unit. Connection between unit controllers shall be with a modular cable. Controller shall be capable of communicating and integrating with a LonWorks or BACnet network. [WattMaster Orion Controls System]

N. Accessories

- 1. Unit shall be provided with a safety shutdown terminal block for field installation of a smoke detector which shuts off the unit's control circuit.

2.03 Curbs

- A. Curbs shall to be fully gasketed between the curb top and unit bottom with the curb providing full perimeter support, cross structure support and air seal for the unit. Curb gasket shall be furnished within the control compartment of the rooftop unit to be mounted on the curb immediately before mounting of the rooftop unit.
- B. Solid bottom curb shall be factory assembled and fully lined with 1 inch neoprene coated fiberglass insulation and include a wood nailer strip. (See attached Curb drawing)

Part 3 - Execution

3.01 Installation, Operation, and Maintenance

- A. Installation, Operation, and Maintenance manual shall be supplied with the unit.
- B. Installing contractor shall install unit, including field installed components, in accordance with Installation, Operation, and Maintenance manual instructions.
- C. Start up and maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

