Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Submittal

Date: 01/14/15

Job: 1332
409 Cumberland Ave
409 Cumberland Avenue
Portland, ME

Spec Section No: 230000 2.12
Submittal No: 1
Revision No: 0
Sent Date: 1/8/2014
Due Date: 1/15/2014

Spec Section Title:

Submittal Title: ERV Energy Heat Recovery Equipment

Contractor:
Ranor Mechanical

Contractor's Stamp

General Contractor:
Wright-Ryan Construction, Inc

Architect's Stamp

Engineer's Stamp

Submittal Information Form

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Specifications Dated: _____

Date: 01/14/15

Drawings Dated (if applicable): September 16, 2013

1 Project: 409 Cumberland Avenue - Avesta

2 Specification Title: Total Energy Heat Recovery Equipment

3 Description: Energy Recovery Units

4 Section: 23000 2.8 *Spec book denotes this as 2.8 but there is already a 2.8 Unit Heater; I believe this should be 230000 2.12;

5 Page/Sheet #: page 8 and 9 of 15

6 Article/Paragraph: _____

7 Basis of Design: Yes for ERU-0, No (if no please fill out 8-12)

8 Proposed Substitution: ERV-1 and ERV-2 will be Trane packaged rooftop w/ Renewaire ERV

9 Manufacturer: _____

10 Trade Name: _____

11 Model #: Ysc120 - Trane rooftop and HE4XRT - Renewaire ERV

12 Please list SPECIFICALLY the deviations from the basis of design: Trane RTU and Renewaire ERV to sit on a single curb and be treated as a packaged unit. Each unit does require separate power.

13 Equipment Lead Time (after approved submittals) 4-5 weeks

Submittal

Trane U

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Inspections Division
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Date: 01/14/15

Engineer: Bennett Engineering

Date: January 08, 2014

Prepared For:
Ranor Mechanical
PO Box 5036
North Jay, ME 04262

Job Name:
409 Cumberland Ave (Avesta)

Customer P.O. Number:
1332-0001

Trane Job Number:

Trane is pleased to provide the enclosed submittal for your review and approval.

Qty	Product	Tag(s)
1	Renewaire Indoor Static Plate Energy Recovery Unit	ERU-0

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Jeff Charette
Trane U.S. Inc. dba Trane
860 Spring Street, Unit 1
Westbrook, ME 04092
Phone: (207) 239-3401
Fax: (207) 828-1511

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Tag Data – Renewaire Energy Recovery Unit (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	ERV-0,	1	Indoor Static Plate ERV	EV450IN

Product Data - Renewaire Energy Recovery Unit

Item: A1 Qty: 2 Tag(s): ERV-1, ERV-2

Renewaire indoor Static Plate Energy Recovery Unit
120v/1ph
EC motor
Rectangular 12” x 8” flange kit (2 each)

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Guide Specifications for RenewAire EV450 Indoor Energy Recovery Ventilators

Part I - General

A. Product Specification

1. Energy Recovery Ventilator (ERV) shall be a packaged unit as manufactured by RenewAire and shall transfer both heat and humidity using static plate core technology.

B. Quality Assurance

1. The energy recovery cores used in these products shall be third party Certified by AHRI under its Standard 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacture's published performanceforairflow,staticpressure,temperature and totaleffectiveness,purgeair (OACF)and exhaustair leakage (EATR). Products that are not currently AHRI Certified will not be accepted.

2. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximumflame spread index(FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

3. Unit shall be Listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers. Some exceptions to UL Listing may apply.

4. The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two years from the date of purchase.

Part II – Performance

A. Energy Transfer

The ERV shall be capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.

B. Passive Frost Control

The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.

C. Continuous Ventilation

Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters or defrost cycles under normal operating conditions.

D. Positive Airstream Separation

Water vapor transfer shall be through molecular transport by hydroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall travel at all times in separate passages, and airstreams shall not mix.

E. Laminar Flow

Airflow through the ERV core shall be laminar over the products entire operating airflow range, avoiding deposition of particulates on the interior of the energy exchange plate material.

Part III – Product

A. Construction

1. The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.

2. No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.

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3. The unit case shall be constructed of G90 galvanized, 20-gauge steel, with lapped corn screw fasteners.

4. Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall compression seal using closed cell foam gaskets. Pressure taps, with captive plugs, sha allowing cross-core pressure measurement allowing for accurate airflow measurement.

5. Case walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with minimum R-value of 4.3 (hr·ft2·°F/BTU).

6. The ERV cores shall be protected by a MERV-8 rated, 2” nominal, pleated, disposable filter in both airstreams.

7. Unit shall have single-point power connection and a single-point 24 VAC contactor control connection.

8. The unit electrical box shall include a factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.

9. Provide ECMcontrolled motors allowing for to presetspeedsor variable speedoperation with a 0-10volt DC control signal.

Part IV – Installation

A. Unit Location

1. Locate and orient unit to provide the shortest and most straight duct connections. Provide service clearances as indicated on the plans. Locate units distant from sound critical occupancies.

2. Provide a poured concrete equipment pad for all floor mounted units. The pad thickness and floor plan dimensions to be determined based on the unit selected, and site structural considerations.

3. Provide a structurally suitable support for the base of any wall mounted or hung units.

B. Vibration Isolation

1. Provide rubber or spring type isolators appropriately sized for corner weights of the specific unit.

2. Provide flexible duct connections at unit duct flanges.

C. Duct Design

1. All ductwork shall be designed, constructed, supported and sealed in accordance with SMACNA HVAC Duct Construction Standards and pressure classifications.

2. At a minimum all duct runs to the outdoors shall be thermally insulated at levels appropriate to the local climate. A continuous vapor barrier shall also be provided on warm surface of the insulation.

D. Sound Control

1. To control sound radiated from the unit:
   a. Provide acoustic treatment in mechanical room walls and ceilings.

2. To control sound associated with the two blower outlets:
   a. Provide straight, gradual transition ductwork for a minimum of 2-1/2 duct diameters downstream from the blower outlet for air velocities of less than 2,500 feet per minute.

   b. Provide continuous acoustic insulation treatment of the duct until after the first elbow or tee.

   c. Provide engineered sound attenuation ductwork to meet noise criteria (NC) requirements.

E. Test and Balancing

1. Test and Balancing may not begin until 100% of the installation is complete and fully functional.

2. Follow National Comfort Institute (NCI) air test and balance procedures specific to Heat RecoveryVentilator Balancing Procedure including standard reports to the owner’s representative.

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Inspections Division
Approved with Conditions

Date: 01/14/15

RenewAire
Energy Recovery Ventilation
Think Greener. Breathe Better.

Unit Report

Project Name:	409 Cumberland Avenue	Project Engineer:	Bennet
Project Address:	Portland ME	Firm/Company Name:	Ranor Mechanical
		Prepared By:	Jeff Charette
Weather Data Location:	Portland, United States	Phone Number:	207-239-3401
Project General Description:		Fax Number:	207-828-1511
		Email Address:	jcharette@trane.com

Tag/Mark/Designation	ERV-0	
Location		
Area Served		
Manufacturer	RenewAire	
Model #	EV450IN	
Core	G5 = J	
Fresh Air Supply (FA)		
CFM	325	
External Static Pressure (in W.C.)	0.50	
Filter Rating (MERV)	MERV-8	
Exhaust Air (EA)		
CFM	325	
External Static Pressure (in W.C.)	0.50	
Filter Rating (MERV)	MERV-8	
Performance Data	**Winter**	**Summer**
Room Exhaust Air		
Dry Bulb (F)	72.0	75.0
Relative Humidity (%)	30	50
Wet Bulb (F)	54.4	62.6
Outside Air		
Dry Bulb (F)	-10.0	87.0
Relative Humidity (%)	45	55
Wet Bulb (F)	-11.0	74.0
Supply Air		
Dry Bulb (F)	53.3	77.7
Relative Humidity (%)	37	60
Wet Bulb (F)	42.1	67.4
Sensible Original Load (BTU/h)	28,782	4,212
Sensible Heat Recovered (BTU/h)	22,231	3,253
Sensible Load Remaining (BTU/h)	6,551	959
Latent Original Load (BTU/h)	7,488	9,172
Latent Heat Recovered (BTU/h)	4,554	4,812
Latent Load Remaining (BTU/h)	2,935	4,359
Total Original Load (BTU/h)	36,270	13,384
Total Heat Recovered (BTU/h)	26,785	8,066
Total Load Remaining (BTU/h)	9,485	5,318
Sensible Recovery Effectiveness (% of Load Reduction)	77	77
Latent Recovery Effectiveness (% of Load Reduction)	61	52
Total Recovery Effectiveness (% of Load Reduction)	74	60
Unit Electrical Data		
V/P/H	115/60/1	
Supply Air Motor HP	0.75 (w/ECM)	
Supply Air Motor FLA	9.0	
Exhaust Air Motor HP	0.75 (w/ECM)	
Exhaust Air Motor FLA	9.0	
MCA (Amps)	11.3	
MOPD (Amps)	15	
Unit Physical Data		
Length (in)	16	
Width (in)	44-1/8	
Height (in)	36-3/8	
Weight (lbs)	141	
Notes		

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Date: 01/14/15

EV450IN ECM

AHRI CERTIFIED® www.ahridirectory.org
Globally Recognized. Industry Respected.

Indoor Unit with ECM Motor Option

Specifications

Ventilation Type: Static Plate, Heat and Humidity Transfer

Typical Airflow Range: 200-560 CFM

AHRI 1060 Certified Core: One L85

Airflow Rating Points (for AHRI): 450 CFM and 338 CFM

Motors: One 0.75 hp ECM

V	HZ	Phase	FLA	Min. Cir. Amps	Max. Overcurrent Protection Device
115	60	Single	9.0	11.3	15
208-230	60	Single	5.1 – 4.9	6.4	15

Standard Features: Non-fused Disconnect
24 VAC Transformer/Relay Package

Filters: Two total, MERV 8, 2" pleated, 14" x 20" nominal size

Weight: 141 lbs (unit), 160 lbs (in carton)
200 lbs (on pallet), up to 3 units on 40 lb pallet

Shipping Dimensions: 48" L x 41" W x 18" H (in carton)
55" L x 42" W x 22" H (on pallet)

Options: Fused Disconnect
Double Wall Construction

Accessories: 45EVHB – Hanging Bracket, Foot Kit
45EVDF – Rectangular 12" x 8" Flange Kit (2 in kit)
45EVT10 – 10" Round Transition Kit (2 in kit)
Wall Caps
Back Draft Dampers
SC-ECM - Remote Potentiometer Speed Control

G5 Performance

*At AHRI 1060 standard conditions
(See certified data on page 73 for core components.)

ECM Option Operating Range

Sample Points			
Point	CFM	ESP*	Watts
1	200	0.20	47
2	238	0.09	55
3	285	0.00	69
4	333	1.25	308
5	596	0.00	639
6	450	0.16	305
7	450	0.64	369

** Inches Water Column*

Note: Watts is for the entire unit.

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RenewAire® Energy Recovery Ventilation

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Date: 01/14/15

EV450IN
Unit Dimensions

EA: Exhaust Air to outdoors
OA: Outdoor Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside

Submittal

Trane U

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/14/15

Engineer: Bennett Engineering

Date: January 08, 2014

Prepared For:
Ranor Mechanical
PO Box 5036
North Jay, ME 04262

Job Name:
409 Cumberland Ave (Avesta)

Customer P.O. Number:
1332-0001

Trane Job Number:

Trane is pleased to provide the enclosed submittal for your review and approval.

Qty	Product	Tag(s)
2	10 Ton Trane Packaged Gas/Electric Rooftop	RTU-1, RTU-2
2	Renewaire Static Plate Energy Recovery Unit	ERV-1, ERV-2

Please note:

- Trane proposed an alternate to the specified ERV-1 and ERV-2. This submittal reflects that alternate. Trane will provide a 10 ton packaged rooftop along with a Renewaire Static Plate Energy Recovery Unit that will sit on one common curb. Each unit will require its own separate power. Note, that due to the minimum airflow requirements of the 10 ton rooftop, the units have been sized for 3200cfm.

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Jeff Charette
Trane U.S. Inc. dba Trane
860 Spring Street, Unit 1
Westbrook, ME 04092
Phone: (207) 239-3401
Fax: (207) 828-1511

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Date: 01/14/15

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Date: 01/14/15

Tag Data - 10 Ton R410A PKGD Unitary Gas/Electric Rooftop (Qty: 2)

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-1, RTU-2	2	10 Ton Gas/Electric Rooftop	YSC120F3RLA--D000000003000(

Product Data - 10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

DX cooling, gas heat
Standard efficiency
Convertible configuration
10 Ton
208-230/60/3
Microprocessor controls
Low gas heat
Economizer Dry Bulb 0-100% with Barometric Relief
Frostat and crankcase heater

Note: Performance data for the packaged rooftops is based off the performance data at design conditions off the Renewaire energy recovery unit

3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/14/15

Job Information

409 Cumberland Ave (Avesta)
Portland ME

Tag	RTU-1, RTU-2		
Quantity	2	Model number	YSC120

Unit Information

Tonnage	10 Ton	Unit function	DX cooling, gas heat
Min. unit operating weight	1124.0 lb	Max. unit operating weight	1369.0 lb
Design Airflow	3200 cfm		

Cooling Information

Gross Total Capacity	116.82 MBh	Gross Sensible Capacity	73.39 MBh
Gross Latent Capacity	43.43 MBh	Net Total Capacity	112.43 MBh
Net Sensible Capacity	69.00 MBh	Net Sensible Heat Ratio	0.61 Number
Cooling Entering DB	78.50 F	Cooling Entering WB	68.50 F
Cooling Leaving Unit DB	58.89 F	Cooling Leaving Unit WB	57.55 F
Ambient Temp	95.00 F		

Heating Information

Heating capacity	Low gas heat 3ph	Input Heating Capacity	150.00 MBh
Output Heating Capacity	120.00 MBh	Heating EAT	47.00 F
Heating LAT	82.00 F	Heating Delta T	35.00 F

Motor/Electrical Information

Voltage	208-230/60/3	Design ESP	1.000 in H2O
Indoor Motor Power	1.18 kW	Indoor mtr operating power	1.59 bhp
Indoor RPM	1307 rpm	Outdoor Motor Power	0.69 kW
Compressor Power	8.40 kW	System Power	10.27 kW
MCA	49.60 A	MOP	60.00 A
Compressor 1 RLA	20.50 A	Evaporator fan FLA	8.50 A
Condenser fan FLA	4.00 A		

Information for LEED Projects

ASHRAE 90.1	Yes	IEER	12.50
Refrig charge (HFC-410A) - ckt 1	5.5 lb	Compressor Power	8.40 kW
Refrig charge (HFC-410A) - ckt 2	4.2 lb	Outdoor Motor Power	0.69 kW
Rated capacity (AHRI)	113.00 MBh	Indoor mtr operating power	1.59 bhp
EER @ AHRI Conditions	11.3 EER	Exhaust fan power	0.65 kW

Note: This product meets the minimum equipment efficiency requirements of ASHRAE Standard 90.1-2007 and -2010 (which are based on AHRI standard rating conditions) and, therefore, also meets the LEED "Minimum Energy Performance" prerequisite in the Energy and Atmosphere section. The power data listed above is at actual user-entered conditions. Refer to the product catalog for performance at AHRI standard rating conditions.

The LEED Green Building Rating System™, developed by the U.S. Green Building Council, provides independent, third-party verification that a building project meets green building and performance measures.

Mechanical Specifications - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

RESURGAM. CITY OF PORTLAND, MAINE
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General
The units shall be convertible airflow. The operating range shall be between 115°F and 0°F in the factory for units with microprocessor controls. Operating range for units with electromecha between 115°F and 40°F. Cooling performance shall be rated in accordance with ARI testing p be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be cULus listed and labeled, classified in accordance for Central Cooling Air Conditioners.

Casing
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have lifting handles and be removed and reinstalled by removing two fasteners while providing a water and air tight seal. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material. The base of the unit shall be insulated with 1/8 inch, foil-faced, closed-cell insulation. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.

Unit Top
The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top.

Filters
Throwaway filters shall be standard on all units. Optional 2-inch MERV 8 and MERV 13 filters shall also be available.

Compressors
All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors.

Dual compressors are outstanding for humidity control, light load cooling conditions and system back-up applications. Dual compressors are available on 7½-10 ton models and allow for efficient cooling utilizing 3-stages of compressor operation for all high efficiency models.

Notes:
Crankcase heaters are optional on YSC (036, 048, 060, 072, 090, 102, 120); standard on YHC (036, 048, 060, 072, 092, 102, 120).

Indoor Fan
The following units shall be equipped with a direct drive plenum fan design (T/YSC120E, T/YHC092,102, 120E). Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor. All plenum fan designs will have a variable speed adjustment potentiometer located in the control box. 3-5 ton units (standard efficiency 3-phase or high efficiency 3-phase with optional motor) are belt driven, FC centrifugal fans with adjustable motor sheaves. 3-5 ton units (1-phase or high efficiency 3-phase) have multispeed, direct drive motors. All 6-8½ ton units (standard efficiency) shall have belt drive motors with an adjustable idler-arm assembly for quick-adjustment to fan belts and motor sheaves. All motors shall be thermally protected. All 10 tons and 7½-8½ (high efficiency) have variable speed direct drive motors. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Outdoor Fans
The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor shall be permanently lubricated and shall have built-in thermal overload protection.

Evaporator and Condenser Coils
Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. The microchannel type condenser coil is standard for the T/YSC 10 ton models and 7½ ton high efficiency models. The microchannel type condenser coil is not offered onthe 7½ ton dehumidification model. Due toflat streamlined tubes with

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small ports, and metallurgical tube-to-fin bond, microchannel coil has better heat transfer perf condenser coil can reduce system refrigerant charge by up to 50% because of smaller interna better compressor reliability. Compact all-aluminum microchannel coils also help to reduce th All-aluminum construction improves re-cyclability. Galvanic corrosion is also minimized due to construction. Strong aluminum brazed structure provides better fin protection. In addition, flat make microchannel coils more dust resistant and easier to clean. Coils shall be leak tested at pressure integrity. The evaporator coil and condenser coil shall be leak tested to 600 psig. The leak tested to 465 psig. The condenser coil shall have a patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning. A removable, reversible, double-sloped condensate drain pan with through the base condensate drain is standard.

Controls
Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. A choice of microprocessor or electromechanical controls shall be available. Microprocessor controls provide for all 24V control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes driftfromset point, and provides better building comfort. A centralized microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection. 24-volt electromechanical control circuit shall include control transformer and contactor

High Pressure Control
All units include High Pressure Cutout as standard.

Phase monitor
Phase monitor shall provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator. There are no field adjustments. The module will automatically reset from a fault condition.

Refrigerant Circuits
Each refrigerant circuit offer thermal expansion valve as standard. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.

Gas Heating Section
The heating section shall have a progressive tubular heat exchanger design using stainless steel burners and corrosion resistant steel throughout. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes. The heater shall use a direct spark ignition (DSI) system. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor. Units shall be suitable for use with natural gas or propane (field-installed kit) and also comply with the California requirement for low NOx emissions (Gas/Electric Only).

Economizer
This accessory shall be available with or without barometric relief. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment off cycle. Optional solid state or differential enthalpy control shall be available for either factory or field installation. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.

Frostat
This option is to be utilized as a safety device. The Frostat opens when temperatures on the evaporator coil fall below 10°F. The temperature will need to rise to 50°F before closing. This option should be utilized in low airflow or high outside air applications. (Cooling with Electric Heat Only.)

Frostat
This option is to be utilized as a safety device.The Frostat opens when temperatures on the evaporator coil fall below 10°F.The temperature will need to rise to 50°F before closing.This feature should be utilized in low airflow or high outside air applications (cooling only).

ERV-Mate Roof curb for a Trane YSC120F with a Renewaire HE4XRT

20” overall height, 18ga. Galvanized steel construction, 2” base flange, 1 ½” thick fiberglass ins
ERV curb with necessaryreturn air and fresh air plenum sections, supplyair duct supports, nec
2”x2” wood nailer

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Inspections Division
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Date: 01/14/15

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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Date: 01/14/15

PACKAGED GAS / ELECTRICAL

ISOMETRIC VIEW

NOTES:
1. THRU -THE -BASE ELECTRICAL IS NOT STANDARD ON ALL UNITS.
2. VERIFY ALL DIMENSIONS WITH INSTALLER DOCUMENTS BEFORE INSTALLATION.

PLAN VIEW UNIT

DIMENSION DRAWING

PACKAGED GAS / ELECTRICAL

DIMENSION DRAWING

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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ISOMETRIC-PACKAGED COOLING

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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Inspections Division
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Date: 01/14/15

ELECTRICAL / GENERAL DATA

GENERAL (2)(4)(6)

Model:	YSC120F	Oversized Motor	
Unit Operating Voltage:	187-253	MCA:	N/A
Unit Primary Voltage:	208	MFS:	N/A
Unit Secondary Voltage	230	MCB:	N/A
Unit Hertz:	60		
Unit Phase:	3		
EER	11.3		
Standard Motor		Field Installed Oversized Motor	
MCA:	49.6	MCA:	N/A
MFS:	60.0	MFS:	N/A
MCB:	60.0	MCB:	N/A

HEATING PERFORMANCE

HEATING - GENERAL DATA

Heating Model:	Low
Heating Input (BTU):	150,000/105,000
Heating Output (BTU):	120,000/84,000
No. Burners:	3
No. Stages	2
Gas Inlet Pressure	
Natural Gas (Min/Mix):	4.5/14
LP (Min/Max)	10.0/14.0
Gas Pipe Connection Size:	3/4"

INDOOR MOTOR

Standard Motor		Oversized Motor		Field Installed Oversized Motor	
Number:	1	Number:	N/A	Number:	N/A
Horsepower:	3.8	Horsepower:	N/A	Horsepower:	N/A
Motor Speed (RPM):	--	Motor Speed (RPM):	N/A	Motor Speed (RPM):	N/A
Phase	3	Phase	N/A	Phase	N/A
Full Load Amps:	8.5-8.5	Full Load Amps:	N/A	Full Load Amps:	N/A
Locked Rotor Amps:	-	Locked RotorAmps:	N/A	Locked Rotor Amps:	N/A

COMPRESSOR Circuit 1/2

Number:	2
Horsepower:	4.8/3.7
Phase:	3
Rated Load Amps:	20.5/16.0
Locked Rotor Amps:	155.0/91.0

OUTDOOR MOTOR

Number:	1
Horsepower:	0.75
Motor Speed (RPM):	1100
Phase:	1
Full Load Amps:	4.0
Locked Rotor Amps:	9.4

POWER EXHAUST ACCESSORY (3)

(Field Installed Power Exhaust)

Phase:	N/A
Horsepower:	N/A
Motor Speed (RPM):	N/A
Full Load Amps:	N/A
Locked Rotor Amps:	N/A

FILTERS

Type:	Throwaway
Furnished:	Yes
Number	4
Recommended	20"x25"x2"

REFRIGERANT (2)

Type	R-410
Factory Charge	
Circuit #1	5.5 lb
Circuit #2	4.2 lb

NOTES:
1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only.
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory.
4. Value includes oversized motor.
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.

Weight, Clearance & Rigging Diagram - 3-10 Ton R410A PKGD Unitary Gas/Electric Roo
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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PACKAGED GAS / ELECTRICAL

CORNER WEIGHT

INSTALLED ACCESSORIES NET

ACCESSORY	
ECONOMIZER	30.0 lb
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	
POWER EXHAUST	
THROUGHT THE BASE ELECTRICAL/GAS (FIOPS)	
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	
UNIT MOUNTED DISCONNECT (FIOPS)	
POWERED CONVENIENCE OUTLET (FIOPS)	
HINGED DOORS (FIOPS)	
HAIL GUARD	
SMOKE DETECTOR, SUPPLY / RETURN	
NOVAR CONTROL	
STAINLESS STEEL HEAT EXCHANGER	
REHEAT	
ROOF CURB	

BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITIY	
SHIPPING	NET	A	345.0 lb	C	258.0 lb	(E) LENGHT	(F)WIDTH
1156.0 lb	1058.0 lb	B	242.0 lb	D	213.0 lb	41"	23"

NOTE:
1. CORNER WEIGHTS ARE GIVEN FOR INFORMATION ONLY.
2. TO ESTIMATE SHIPPING WEIGHT ADD 5 LBS TO NET WEIGHT.
3. BASIC UNIT WEIGHT DOES NOT INCLUDE ACCESSORY WEIGHT. TO OBTAIN TOTAL WEIGHT, ADD ACCESSORY NET WEIGHT TO BASIC UNIT WEIGHT.
4. WEIGHTS FOR OPTIONS NOT LISTED ARE <5 LBS.

PACKAGED GAS / ELECTRICAL

RIGGING AND CENTER OF GRAVITY

Weight, Clearance & Rigging Diagram - 3-10 Ton R410A PKGD Unitary Gas/Electric Roo
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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PACKAGED GAS / ELECTRIC

CLEARANCE

PACKAGED GAS / ELECTRIC

DOWNFLOW TYPICAL ROOF OPENING

Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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ACCESSORY - BAROMETRIC RELIEF DAMPER HOOD

Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 2 Tag(s): RTU-1, RTU-2

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ACCESSORY - ECONOMIZER HOOD

ERV-Mate Roof Curb for Trane YSC120F with a Renewaire HE4XRT

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Date: 01/14/15

Tag Data – Renewaire Energy Recovery Unit (Qty: 2)

Item	Tag(s)	Qty	Description	Model Number
A1	ERV-1, ERV-2	2	Outdoor Static Plate ERV	HE4XRT

Product Data - Renewaire Energy Recovery Unit

Item: A1 Qty: 2 Tag(s): ERV-1, ERV-2

Renewaire outdoor Static Plate Energy Recovery Unit
208v/3ph
3 horsepower supply fan
3 horsepower exhaust fan
Motorized isolation dampers in outside air and exhaust airstreams
Painted cabinet

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Guide Specifications for RenewAire HE4X
Packaged Rooftop Energy Recovery Ventila

Part I - General

A. Product Specification

1. EnergyRecoveryVentilator(ERV) shallbe a packaged unit as manufactured byRenewAire and shall transfer both heat and humidity using static plate core technology.

B. Quality Assurance

1. The energy recovery cores used in these products shall be third party Certified by AHRI under its Standard 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacture's published performance for airflow, static pressure, temperature and total effectiveness, purge air (OACF) and exhaust air leakage (EATR). Products that are not currently AHRI Certified will not be accepted.

2. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

3. Unit shall be Listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers. Some exceptions to UL Listing may apply. Units intended for "Outdoor Use" shall be listed using the specific UL requirements for rain penetration, corrosion protection and seal durability and shall be so labeled.

4. The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functionalcharacteristics, under circumstances of normal use, for a period of two years from the date of purchase.

Part II – Performance

A. Energy Transfer

The ERV shall be capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one air stream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.

B. Passive Frost Control

The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humiditybelow 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.

C. Continuous Ventilation

Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters, or defrost cycles under normal operating conditions.

D. Positive Airstream Separation

Water vapor transfer shall be through molecular transport by hydroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall travel at all times in separate passages, and airstreams shall not mix.

E. Laminar Flow

Airflow through the ERV core shall be laminar over the products entire operating airflow range, avoiding deposition of particulates on the interior of the energy exchange plate material.

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Part III – Product

A. Construction

1. The energy recovery component shall be of fixed-plate cross-flow construction, with no mo

2. No condensate drain pans or drains shall be allowed and unit shall be capable of operating conditions without generating condensate.

3. The unit case shall be constructed of G90 galvanized, 20-gauge steel, with lapped corners and zinc plated screw fasteners. The unit roof shall be one piece or have watertight standing seam joints and shall overlap wall panels and doors in order to positively shed water.

4. Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets rated for outdoor exposure. Pressure taps, with captive plugs, shall be provided allowing cross-core pressure measurement allowing for accurate airflow measurement.

5. Weatherhoods shall be screened to exclude birds and animals. Inlet weatherhoods shall be sized to maintain inlet velocities below 500 fpm, and equipped with rain excluder baffles.

6. Case walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibilityof exposing thefresh air to glass fibers, and with minimum R-value of 4.3 (hr·ft2·°F/BTU).

7. The ERV cores shall be protected by a MERV-8 rated, 2” nominal, pleated, disposable filter in both airstreams.

8. Unit shall have single-point power connection and a single-point 24 VAC contactor control connection .

9. Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and shallbe supplied with factoryinstalled motor starters (HE6Xand HE8X208-230/460V models are open drip proof). Direct drive models (EV450 and HE1X models) shall be EISA compliant for energy efficiency with open drip proof design and integral thermal protection.

10. Blowers shallbe quiet running,forward curve type and be either direct drive (EV450 and HE1Xonly) or belt drive. HE6X and HE8X units use backward incline, belt drive blower packages. Belt drive motors shall be provided with adjustable pulleys and motor mounts allowing for blower speed adjustment, proper motor shaft orientation and proper belt tensioning.

11. The unit electrical box shall include a factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.

12. The ERV shall be provided “inverter-ready” allowing for applications of inverters supplied and installed by others.

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Date: 01/14/15

RenewAire
Energy Recovery Ventilation
Think Greener. Breathe Better.

Unit Report

Project Name:	409 Cumberland Avenue	Project Engineer:	Bennett I
Project Address:	Portland ME	Firm/Company Name:	Ranor Me
		Prepared By:	Jeff Char
Weather Data Location:	Portland, United States	Phone Number:	207-239-3401
Project General Description:		Fax Number:	207-828-1511
		Email Address:	jcharette@trane.com

Tag/Mark/Designation	ERV-1	
Location		
Area Served		
Manufacturer	RenewAire	
Model #	HE4XRT	
Core	G5 = J	
Fresh Air Supply (FA)		
CFM	3,200	
External Static Pressure (in W.C.)	0.75	
Filter Rating (MERV)	MERV-8	
Exhaust Air (EA)		
CFM	3,200	
External Static Pressure (in W.C.)	0.75	
Filter Rating (MERV)	MERV-8	
Performance Data	**Winter**	**Summer**
Room Exhaust Air		
Dry Bulb (F)	72.0	75.0
Relative Humidity (%)	30	50
Wet Bulb (F)	54.4	62.6
Outside Air		
Dry Bulb (F)	-10.0	87.0
Relative Humidity (%)	45	55
Wet Bulb (F)	-11.0	74.0
Supply Air		
Dry Bulb (F)	47.2	78.6
Relative Humidity (%)	38	61
Wet Bulb (F)	37.7	68.6
Sensible Original Load (BTU/h)	283,392	41,472
Sensible Heat Recovered (BTU/h)	197,611	28,919
Sensible Load Remaining (BTU/h)	85,781	12,553
Latent Original Load (BTU/h)	73,732	90,304
Latent Heat Recovered (BTU/h)	36,815	36,844
Latent Load Remaining (BTU/h)	36,917	53,460
Total Original Load (BTU/h)	357,124	131,776
Total Heat Recovered (BTU/h)	234,426	65,763
Total Load Remaining (BTU/h)	122,697	66,013
Sensible Recovery Effectiveness (% of Load Reduction)	70	70
Latent Recovery Effectiveness (% of Load Reduction)	50	41
Total Recovery Effectiveness (% of Load Reduction)	66	50
Unit Electrical Data		
V/P/H	208-230/60/3	
Supply Air Motor HP	3.0 (w/o VFD)	
Supply Air Motor FLA	9.4-8.5	
Exhaust Air Motor HP	3.0 (w/o VFD)	
Exhaust Air Motor FLA	9.4-8.5	
MCA (Amps)	21.1	
MOPD (Amps)	25	
Unit Physical Data		
Length (in)	82-1/4	
Width (in)	89-3/4	
Height (in)	40-3/8	
Weight (lbs)	915	
Notes		

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/14/15

RenewAire
Energy Recovery Ventilation
Think Greener. Breathe Better.

Unit Report

Project Name:	409 Cumberland Avenue	Project Engineer:	Benne
Project Address:	Portland ME	Firm/Company Name:	Ranor
		Prepared By:	Jeff Charette
Weather Data Location:	Portland, United States	Phone Number:	207-239-3401
Project General Description:		Fax Number:	207-828-1511
		Email Address:	jcharette@trane.com

Tag/Mark/Designation	ERV-2	
Location		
Area Served		
Manufacturer	RenewAire	
Model #	HE4XRT	
Core	G5 = J	
Fresh Air Supply (FA)		
CFM	3,200	
External Static Pressure (in W.C.)	0.75	
Filter Rating (MERV)	MERV-8	
Exhaust Air (EA)		
CFM	3,200	
External Static Pressure (in W.C.)	0.75	
Filter Rating (MERV)	MERV-8	
Performance Data	**Winter**	**Summer**
Room Exhaust Air		
Dry Bulb (F)	72.0	75.0
Relative Humidity (%)	30	50
Wet Bulb (F)	54.4	62.6
Outside Air		
Dry Bulb (F)	-10.0	87.0
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Dry Bulb (F)	47.2	78.6
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Supply Air Motor HP	3.0 (w/o VFD)	
Supply Air Motor FLA	9.4-8.5	
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Exhaust Air Motor FLA	9.4-8.5	
MCA (Amps)	21.1	
MOPD (Amps)	25	
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Length (in)	82-1/4	
Width (in)	89-3/4	
Height (in)	40-3/8	
Weight (lbs)	915	
Notes		

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HE4XRT

Outdoor Unit

G5 Performance

*At AHRI 1060 standard conditions
(See certified data on page 73 for core components.)

Base Type/Airflow Orientations

Specifications

Ventilation Type: Static Plate, Heat and Humi						
Typical Airflow Range: 1,000-4,400 CFM						
AHRI 1060 Certified Core: Four L125-00						
Airflow Rating Points (for AHRI): 3,000 CFM and 2,250 CFM						
Number Motors: Two belt drive blower/motor packages with adjustable sheaves						
HP	Volts	HZ	Phase	FLA (per motor)	Min. Cir. Amps	Max. Overcurrent Protection Device
2	115	60	Single	20.0	45.0	60
	208-230	60	Single	10.8-10.0	24.3	35
	208-230	60	Three	6.1-5.8	13.6	15
	460	60	Three	2.9	6.5	15
	575	60	Three	2.4	5.4	15
3	208-230	60	Single	13.0-11.8	29.3	40
	208-230	60	Three	9.4-8.5	21.1	25
	460	60	Three	4.2	9.5	15
	575	60	Three	3.3	7.4	15
5	208-230	60	Three	14.5-13.4	32.6	45
	460	60	Three	6.7	15.1	20
	575	60	Three	5.3	11.9	15
Optional Factory Installed VFD Electrical Specifications						
2	208-230	60	Single	6.1-5.8	26.0	30
	208-230	60	Three	6.1-5.8	15	15
	460	60	Three	2.9	7.2	15
	575	60	Three	2.4	5.9	15
3	208-230	60	Single	9.4-8.5	40.2	45
	208-230	60	Three	9.4-8.5	23.2	25
	460	60	Three	4.24	10.5	15
	575	60	Three	3.3	8.2	15
5	208-230	60	Three	14.5-13.4	35.9	45
	460	60	Three	6.7	16.6	20
	575	60	Three	5.3	13.1	15

Standard Features: Totally Enclosed Premium Efficiency Motors
Motor Starters, Non-fused Disconnect
24 VAC Transformer/Relay Package

Filters: Eight total, MERV 8, 2" pleated, 20" x 20" nominal size

Weight: 941 lbs (unit), 1,100 lbs (shipping weight, on pallet)

Shipping Dimensions: 92" L x 72" W x 65" H

Options:
- Fused disconnect
- Double wall construction
- Factory supplied and mounted Variable Frequency Drives (VFDs) – one or both airstreams
- Motorized isolation dampers, OA, EA or both airstreams
- Factory mounted Filter Alarms (2)
- Exterior paint – white standard – custom colors available

Airflow Performance

Motor HP	Blower RPM	Turns Open	External Static Pressure (in. w.g.) 0.00 SCFM	0.00 BHP	0.25 SCFM	0.25 BHP	0.50 SCFM	0.50 BHP	0.75 SCFM	0.75 BHP	1.00 SCFM	1.00 BHP	1.25 SCFM	1.25 BHP	1.50 SCFM	1.50 BHP
2	1186	4	3099	1.5	2790	1.3	2295	1.1	1790	0.8	1150	0.6				
	1326	2	3465	2.2	3185	1.9	2810	1.7	2335	1.4	1885	1.2	1290	0.9		
	1466	0									2451	1.8	2026	1.5	1485	1.2
3	1455	4	3812	2.7	3550	2.5	3285	2.3	2820	2.0	2400	1.7	1970	1.5	1450	1.2
	1527	3			3750	2.9	3500	2.7	3085	2.4	2676	2.1	2300	1.9	1815	1.5
	1598	2							3350	2.6	2950	2.6	2590	2.3	2175	2.0
	1670	1									3210	3.0	2870	2.7	2500	2.4
	1742	0													2800	2.9
5	1623	4	4165	3.7	3965	3.5	3750	3.3	3475	3.0	3055	2.5	2685	2.3	2290	2.0
	1728	2			4240	4.3	4050	4.0	3820	3.7	3450	3.3	3050	3.0	2720	2.6
	1832	0					4345	4.9	4140	4.5	3850	4.2	3490	3.7	3145	3.3

Note: Brake Horse Power (BHP) is for one blower motor package only.

Operation in this zone will likely exceed FLA limits. **Operation in this zone outside of core airflow limits.**

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RenewAire Energy Recovery Ventilation

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