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## Product Guide Specification

**Specifier Notes:** This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat*, *SectionFormat*, and *PageFormat*, as described in *The CSI Construction Specifications Practice Guide*.

This section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all "Specifier Notes" after editing this section.

Section numbers and titles are from *MasterFormat 2012 Update*.

### SECTION 23 72 13

#### AIR HANDLING UNIT

**Specifier Notes:** This section covers Systemair Inc. "Geniox Series" air handling units. Consult Systemair Inc. for assistance in editing this section for the specific application.

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

A. Air handling unit.

##### 1.2 RELATED REQUIREMENTS

**Specifier Notes:** Edit the following list of related sections as necessary. Limit the list to sections with specific information that the reader might expect to find in this section, but is specified elsewhere. Include section number and title.

A. Section 23 08 00 – Commissioning of HVAC.

8 Rouse Street  
Systemair Geniox Series  
Air Handling Unit

### 1.3 REFERENCE STANDARDS

Specifier Notes: List standards referenced in this section, complete with designations and titles. Delete standards not included in the edited section. Including a standard in this list does not require compliance with that standard.

- A. AHRI 410 – Forced-Circulation Air-Cooling and Air-Heating Coils
- B. AHRI 1060 – Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.
- C. AMCA 300 – Test Code for Sound Rating Air Moving
- D. AMCA 500 – Test Methods for Louver, Dampers and Shutters
- E. ASHRAE 84 – Method of Testing Air-to-Air Heat Exchangers.
- F. CSA C22.2, No. 236 – Heating and Cooling Equipment.
- G. NFPA 70 – National Electrical Code (NEC).
- H. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.
- I. UL 900 – Standard for Air Filter Units.
- J. UL 1995 – Standard for Heating and Cooling Equipment.
- K. UL 94 – Test for Flammability of Plastic Materials for Parts in Devices and Appliances.
- L. NFPA 90A – Standard for the installation of Air Conditioning and Ventilation Systems
- M. ASHRAE 62 – Ventilation for Acceptable Indoor Air Quality
- N. ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings
- O. ASHRAE 111 Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems
- P. SMACNA Leakage Class Rating System

## 1.4 PREINSTALLATION MEETINGS

Specifier Notes: Edit pre installation meetings as necessary. Delete if not required.

- A. Convene pre installation meeting [1 week] [2 weeks] before start of installation of air handling units
- B. Require attendance of parties directly affecting work of this section, including Contractor, Architect, Engineer, installer, and manufacturer's representative.
- C. Review materials, preparation, installation, adjusting, demonstration, protection, and coordination with other work.

## 1.5 SUBMITTALS

Specifier Notes: Edit submittal requirements as necessary. Delete submittals not required.

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including preparation and installation instructions.
- C. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details.
  - 1. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
  - 2. Include manufacturer's names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
- D. Manufacturer's Certification: Submit manufacturer's certification that air handling units comply with specified requirements and are suitable for intended application.
- E. Manufacturer's Project References: Submit manufacturer's list of successfully completed air handling unit projects, including project name and location, name of architect and engineer, and type and quantity of air handling units furnished.
- F. Installer's Project References: Submit installer's list of successfully completed air handling unit projects, including project name and location, name of architect and engineer, and type and quantity of air handling units installed.
- G. Operation and Maintenance Data:
  - 1. Submit manufacturer's operation and maintenance manual; including the following:
    - a. Operation, maintenance, adjustment, and cleaning instructions.
    - b. Troubleshooting guide.
    - c. Parts list.
    - d. Electrical wiring diagrams.
  - 2. Provide detailed information required for Owner to properly operate and maintain equipment.

- H. Warranty Documentation: Submit manufacturer's standard warranty.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications:
  - 1. Manufacturer regularly engaged, for past 25 years, in manufacture of air handling units of similar type to that specified.
  - 2. (VRF if applicable) Manufacturer shall have minimum 7 years of experience working with VRF components and units.
- B. Installer's Qualifications:
  - 1. Installer regularly engaged, for past 25 years, in installation of air handling units of similar type to that specified.
  - 2. Employ persons trained for installation of air handling units.

## **1.7 SAFETY AGENCY LISTED & CERTIFICATION**

- A. Air handling units shall conform to UL Standard 1995 and CAN/CSA Standard C22.2 No. 236 requirements and shall be listed with pertinent certifying body.
- B. Air handling unit water heating and cooling coils shall be certified in accordance with the forced circulation air cooling and air heating certification program, which is based on AHRI Standard 410.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery Requirements: Deliver materials to site in manufacturer's original, stretch wrapped, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
  - 1. Store and handle materials in accordance with manufacturer's instructions.
  - 2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
  - 3. Store materials in clean, dry area indoors.
  - 4. Protect materials during storage, handling, and installation to prevent damage.

## **1.9 WARRANTY**

- A. Geniox Limited Warranty Systemair warrants the Equipment manufactured by Systemair for a period of the lesser of 12 months from initial start-up or 18 months from date of shipment, whichever is less, against failure due to defects in material and manufacture and that it has the capacities and ratings set forth in Company's catalogs and bulletins ("Warranty"). Should any failure to conform to the above appear within the lesser of 12 months from initial start-up or 18 months from date of shipment, whichever is less, the unit manufacturer shall upon prompt notification thereof during the Warranty Period and confirmation to the unit manufacturer's satisfaction that the goods have been stored, installed, operated and maintained properly and in accordance with standard industry practice, correct the non-conformity at the unit manufacturer's option either by repairing any defective part or parts or

by making available at the unit manufacturer's plant a repaired or replacement part.

- B. VRF Module (If Applicable) The supplier of the VRF components installed at the factory shall be responsible for the service and warranty of the (LG/Daikin/Mitsubishi/ Samsung) 3rd party VRF kits, (coil(s)) and any applicable components.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

- A. Systemair Inc., 8 Rouse Street, Tillsonburg, Ontario N4G 5W8, Canada. Toll Free 877-797-2471. Phone 519-688-6363. Website [www.systemair.net](http://www.systemair.net). E-mail [sales@systemair.net](mailto:sales@systemair.net).

### **2.2 AIR HANDLING UNITS**

- A. Air Handling Units: "Geniox Series".

Specifier Notes: Specify required model. Consult Systemair Inc. for assistance in determining air handling unit model for the specific application.

*[Select one model only]*

1. Model: Geniox 10, 12, 15, 20, 25, 30, 35, 40
2. Indoor, outdoor, air handling unit(s).
3. Airflow Control: [Variable air volume, Constant air volume].

B. General

1. Each Unit or Group of Units: Capable of operating in any mode independently or dependently of other systems.
2. Capable of changing modes with no interruption to system operation.
3. Listed under CSA C22.2, No. 236/UL 1195.
4. Wiring: NFPA 70.
5. Performance: As scheduled on the Drawings.
6. Equip with control systems from the manufacturer or third party, see controls.
7. Perform all functions necessary for operation.
8. Ventilation to Building: Not to cease in any mode based solely on operational temperature of -30 to 104 degrees F (-34 to 40 degrees C).
9. Capable of operating in winter and summer conditions without imbalance or loss of ventilation capacity greater than specified in design.

C. Unit Cabinet

1. Panels and access doors shall be constructed as minimum 2.4-inch (60-mm) nominal thickness with Polyurethane injected foam insulation with an R-value of no less than R-14. The outer panels shall be constructed of G90 Galvanized 22-gauge steel. The inner liner shall be constructed of G90 galvanized 22-gauge steel
2. The casing and frame design shall be thermally broken so as to negate thermal bridging between the interior and exterior of the unit.

3. Panel deflection shall not exceed L/240 ratio at maximum positive or negative 8 inches of static pressure. Deflection shall be measured at the midpoint of the panel height.
4. The casing leakage shall not exceed 1% of supply air volume at maximum positive or negative 8 inches of static pressure. Measured as per ASHRAE 111 to meet SMACNA Class 6 leakage.
5. Unit panels and doors shall be painted on the exterior and interior with medium that has been tested for 1000 hour salt spray in accordance to ASTM B117
6. Access door shall be of the same construction as panels. The doors shall be have gasketing to ensure SMACNA Class 6 is maintained under negative and positive 8 inches of static pressure. Gasketing shall be fixed to the door and not the door frame.
7. All handles and hinges shall be UV resistant plastic with locks, Door handles shall be designed such that they cannot be used to climb the air handling unit. All handles and hinges shall be corrosion resistant, no metallic handles/hinges shall be accepted.
8. Optional Clear windows shall not adversely affect ASHRAE 111 CLASS 6 rating for leakage
9. Floor construction shall be of sufficient strength to support service personnel of up to 300lbs during maintenance activities.
10. Entire unit shall have a [6.5] [8.6] – inch [full, sectional] 11Ga Painted Steel perimeter base rail for structural rigidity and condensate trapping.
11. Systemair prefabricated roof curb (**if applicable**) to be manufactured of 16 Ga galvanized steel construction meeting ASTM A653/653M. Curb shall be bolted together and be internally reinforced with cross members as required. Heights to be 12" above finished roof deck or as detailed. Top of all roof curbs shall be level. The knockdown curb shall be supplied for site assembly by Systemair.
12. Outdoor units shall be supplied with 18 Ga dual sloped roof installed by the factory. Roof shall be constructed such that all seams be fully sealed and deflect water away from the unit. Roof shall have ice breaks to prevent ice build up between the panels.
13. For ceiling hung units, usage of base rail lifting lugs or a full suspended platform is required to maintain leakage and deflection performance. It is not possible to suspend the unit from hangers in any other way.

#### D. Fans

1. All units shall be equipped with direct-drive plenum fans, with backward-curved impellers with 7 blades made of a polymer composite material, the impellers are installed directly on the motor shafts.
2. All power and sound ratings have been tested and rated according to applicable AMCA Standards and Publications
3. Fans with EC Motors
  - a. Maintenance-free, permanently lubricated, sealed ball bearings.
  - b. Electronically commutated (EC) external rotor motor with integrated EC controller
  - c. Thermal overload protected (TOP).
  - c. UL listed
  - d. IP Protection: Class 54
  - e. Satisfies IE4 (IEC60034-31)
  - f. Mounted for quiet operation.
4. Fans with AC Motors
  - a. Meet NEMA premium efficiency requirements with Service factor of 1.15 and Class F insulation
  - b. Meet ASHRAE 90.1 power consumption and fan motor efficiency requirements
  - c. Direct drive plenum fans coupled to motors at rated speed.

- d. Open Drip Proof (ODP) or Totally Enclosed Fan Cooled (TEFC)
- e. Meets the requirements of NEMA MG1 for VFD application and considered as Inverter Duty motor.
- f. Shall be tested to AMCA 300 Sound performance
- g. Shall be dynamically balanced from the fan manufacturer
- h. Vibration Isolation –Steel Spring Isolators
- 5. Variable Frequency Drives (VFD)
  - a. All AC fans shall have a VFD to control a variable or constant speed setting
  - b. VFD shall be supplied by [air handling unit manufacturer, others mounted in the field by a third party (contractor)]
  - c. Properly sized non fused disconnect and line fuses shall be provided by [Manufacturer, others mounted in the field by a third party (contractor)] for all fan/VFD's.
  - d. Units with factory mount controls will include wiring to the motor VFD junction box. When VFD is supplied by factory all wiring to motors will be complete and ready for operations when air handling unit is installed
  - e. Shall be UL508C & CSA certified and conform to applicable NEMA, ICS, NFPA & IEC Standards
- 6. Separate fans for exhaust and supply blowers.
- 7. Differential pressure transducer (Factory Supplied Controls) shall be mounted across involute of fan to allow constant and variable airflow control.

E. Energy/Sensible Recovery Wheel

- 1. Rotor Matrix: Corrosion-resistant aluminum alloy, composed of alternating corrugated and flat, continuously wound layers of uniform width that guarantee laminar air flow and low static pressure loss.
- 2. Counter-flow construction type.
- 3. Free cooling capacity accomplished by stopping the wheel. Wheel shall not exceed .5 inches of pressure when stopped.
- 4. Performance: Certified and listed by AHRI 1060.
- 5. Rotor Wheel: 8-10 inch-thick wheel reinforced with spokes, welded at hub and perimeter to prevent uneven run-out during normal operations.
- 6. Enthalpy wheels shall be Corrugated Surfaces: Coated with thin, non-migrating, adsorbent, Zeolite particles.
- 7. Effectiveness of Wheel: Documented in accordance with ASHRAE 84 and AHRI 1060.
- 8. Flame Spread Index, Energy Recovery Wheel, UL 723: Not over 25.
- 9. Smoke Developed Index, Energy Recovery Wheel, UL 723: Not over 50.
- 10. EATR % shall be 5% or less
- 11. Bypass Dampers for ERW frost control installed along side the Recovery Wheel will adhere to the following:
  - Factory installed dampers tested in accordance with AMCA 500.
  - Dampers shall have airfoil blades, extruded EPDM Seals.
  - Dampers shall have a maximum leakage rate of 4 CFM/square foot at 1" w.g. (CLASS 1), and shall comply with ASHRAE 90.1.
  - Provide factory-mounted modulating actuators(if selected) for dampers to aide Recovery Wheel with frost control.
- 12. Frost Control Methodologies
  - a. Timed defrost is standard on all units with Factory Controls
  - b. Factory Supplied VFD variable speed wheel defrost See VFD for specifications on

- acceptable VFD's
- c. Pre-heat with [Electric, HW Coil]
- d. Bypass Dampers (If Applicable)

F. Enthalpy/Sensible Recovery Core

1. Sensible Core: Corrosion-resistant aluminum alloy, composed of alternating corrugated and flat, continuously wound layers of uniform width that guarantee laminar air flow and low static pressure loss.
2. Enthalpy Core: Polymer Membrane capable of recovering sensible and latent load through moisture transfer.
3. Cross-flow construction type with EATR of 0.5% or lower.
4. Free cooling capacity accomplished by bypass damper.
5. Performance: Certified and listed by AHRI 1060.
6. Effectiveness of Core: Documented in accordance with ASHRAE 84 and AHRI 1060.
7. Flame Spread Index, Energy Recovery Core, UL 723: Not over 25.
8. Smoke Developed Index, Energy Recovery Core, UL 723: Not over 50.
9. Face and Bypass Dampers for Plate Exchanger will adhere to the following:
  - Factory installed dampers tested in accordance with AMCA 500.
  - Dampers shall have airfoil blades, extruded EPDM Seals.
  - Dampers shall have a maximum leakage rate of 4 CFM/square foot at 1" w.g. (CLASS 1), and shall comply with ASHRAE 90.1.
  - Provide factory-mounted modulating actuators(if selected) for dampers to aide Plate Exchanger with frost control.
  - Dampers shall be sized to provide economizer by allowing up to 100% of the Outside air to bypass the Plate Exchanger.
10. Frost Control Methodologies
  - a. Timed defrost is standard on all units with Factory Controls
  - b. Bypass damper frost control
  - c. Pre-heat with [Electric, HW Coil]

G. Heating and Cooling Coils

1. All hydronic and direct expansion (DX) refrigerant coils shall meet the scheduled performance.
2. All coil performance shall be certified in accordance with AHRI 410, if applicable.
3. All hydronic and direct expansion coils shall be tested at 450 psig air pressure.
4. Coil headers shall be constructed of steel with MPT connections. Headers shall have drain and vent connections accessible from the exterior of the unit.
5. Hydronic coils should have minimum ½ inches OD copper tubes with minimum 0.017 inches tube wall thickness.
6. DX coils shall be provided with seamless ½ inches OD copper tube and all joints shall be brazed.
7. Fins shall have a minimum thickness of 0.006 inches aluminum plate construction
8. Provide a drain pan under each cooling coil. Drain pan shall be stainless steel construction and double sloped towards the drain connection. Drain connection shall be minimum 1" MPT and on the service side of the unit. Drain pan shall comply with ASHRAE 62.1 requirements and shall allow no standing water.

9. Drain pan shall allow visual inspection and physical cleaning to entire surface of the pan without removal of the coil.
10. Bypass Module for Hydronic Coils (If applicable): The manually adjusted bypass coil profile plates shall be constructed with 18 gauge galvanized steel. The profile plate openings shall be sized to ensure a balanced air pressure drop across the coil and profile plate. This enables proper mixing downstream of the coil and the bypass module.
11. Hydronic Coil Control Valves
  - a. Shall be provided by the [AHU manufacturer, Field installed by the Contractor]
  - b. Wiring shall be installed by [the AHU manufacture to the control panel by AHU manufacturer, by the Contractor]

#### H. VRF Module

1. The manufacturer shall provide an air handling unit with factory installed (LG/Daikin/Mitsubishi/ Samsung) VRF 3rd party VRF package integral to the unit and fully assembled, including the customer selected and required EEVs and communication boxes. All VRF components shall be mounted internal to the unit with adequate service access and clearances, externally mounted installations on the front or back panel will not be accepted. Separate power feed to VRF components to be provided on-site by client.
2.
  - a. The unit shall be provided with a customer selected and supplied, Systemair approved primary VRF coil (and Hot Gas reheat coil - if applicable only with LG/Samsung). The DX coil(s) shall be integral to the air handling unit and factory-installed in the coil section with a stainless steel double sloped drain pan. The coil(s) shall be factory piped to the customer supplied EEVs and wired with communication boxes as required for full integral connection and integration of the VRF system. The refrigeration system shall include a factory pressure test and will be stubbed out to a common connection point for field connection. Systemair shall be provided with the refrigerant network diagram indicating specific refrigerant pipe sizes. The customer shall accurately size coils and EEVs compatible with the remote VRF condensing unit(s) to ensure the performance of the VRF system.
  - b. **OR** The unit shall be provided with an empty section for the customer field supplied and Systemair approved primary coil (and Hot Gas Reheat coil - if applicable only with LG/Samsung) with a stainless steel double sloped drain pan for the field installation of the coils. The customer shall provide and pipe the primary VRF coil (and Hot Gas Reheat coil - if applicable only with LG/Samsung) to the EEVs and wire with communication boxes as required. The customer shall accurately size coils and EEVs compatible with the remote VRF condensing unit(s) to ensure the performance of the VRF system.

#### I. Electric Heater

1. Electric heater shall be factory installed ETL listed open wire resistance heater with a single point power connection for the unit and heater.
2. Enables unit to perform in extremely cold climates to preserve performance and ensure continuous supply of air or provides temperature control of supply air.
3. Electric heater shall be constructed of high nickel-chromium alloy resistance wire (80% Ni/20%Cr)

4. Electric heater shall be protected by airflow switch, thermal cutouts with automatic and manual reset, sub-circuit fusing, and control transformer.
5. Units with electric heater function shall be listed under UL-1995 standard for safety.
6. Initiate alarm and shut down of unit when temperature limit switches are activated

J. Dampers

1. Provide dampers tested in accordance with AMCA 500.
2. Provide factory-installed dampers, as shown on drawings.
3. Dampers shall have aluminum airfoil blades, extruded EPDM seals.
4. Dampers shall have a maximum leakage rate of 4 CFM/square foot at 1" w.g (CLASS 1). and shall comply with ASHRAE 90.1.
5. Provide factory-mounted [on-off] [modulating] actuators for all the dampers.
6. Provide a mixing section for the purpose of recirculation

K. Inline Economizer Module

1. Provide dampers tested in accordance with AMCA 500.
2. Provide factory-installed dampers, as shown on drawings.
3. Dampers shall have aluminum airfoil blades, extruded EPDM seals.
4. Dampers shall have a maximum leakage rate of 4 CFM/square foot at 1" w.g (CLASS 1).and shall comply with ASHRAE 90.1.
5. Dampers shall be sized to enable proper mixing of air streams.
6. Provide factory-mounted [modulating] actuators for all the dampers.
7. Dampers for treatment of Outside Air and Exhaust air shall be insulated type with thermally broken frame design.

Outdoor module (If Applicable)

8. The Economizer module shall have field installed hoods shipped loose with the unit. Hoods to be min 22Ga.
9. The Economizer module shall have intake and exhaust streams on opposite sides of the unit to prevent potential cross contamination.

L. Air Filters

1. Filter media shall be UL 900 listed, Class I or Class II.
2. Filters tested in accordance with ANSI/ASHRAE Standard 52.2
3. Flat arrangement with [2"], [4"] deep pleated panel filters. (MERV 8 – 13 )
4. Bag type arrangement with [15"] deep filters. (MERV 9 – 14 )
5. Individual Pockets: Assembled into galvanized steel header providing rigid support to filter.
6. Filter Element: Fully 100% synthetic fiber, not shedding or affected by humidity.
7. Filters are side access removable.
8. Dirty filter switch Adjustable Monitoring System: Activates alarm through main controller when pressure drop increase through supply or exhaust filters.
9. Angled Filters (If Applicable) shall be selected to ensure less than 350 ft/min face velocity.

M. Temperature Sensors: Supplied by others field in stalled

N. Electrical

1. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard

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Item#

C22.2 No236.

2. Electrical Power: 208V/3Ph/60Hz, 460V/3Ph/60Hz or 575V/3Ph/60Hz.
3. Internal Electrical Components: Factory wired for single-point power connection.
4. Standard Main Non-Fused Disconnect
5. Standard Short Circuit Rating = 5kA
6. Electrical Box Components: Accessible without stopping unit or opening unit doors.
7. Electrical Box:
  - a. Isolated from airflow paths.
  - b. Protect integral wires and connections.
8. Controlled by integral microprocessor controller.

## 2.3 AIR HANDLING UNITS CONTROLS

### A. General

1. All air handling units will be equipped with a factory installed and configured DDC controller.
  - a. The controller shall be pre-programmed for ventilation heating cooling applications; no further programming will be required.
  - b. All controller settings, I/O points, configurations, functions, set-points, time schedules, and control modes shall be modifiable via PC software or network.
  - c. Access rights: there shall be three different program access levels: Admin, Service, Operator and Normal. Each level will have a password and grant the following level of access:
  - d. Network level(BAS System): full read/write access to all settings and parameters in all menus.
  - e. Service level: access to all menus except the submenus under Configuration: In- and Outputs & System.
  - f. Normal level: only permits changes in "Running mode" and read-only access to a limited number of menus.
  - g. The controller must be capable of supporting schedule timers and system integration to Building Management Systems via BACnet MS/TP
  - h. Controller Communications: Via BACnet MS/TP communications bus.
  - i. Control Wiring: Installed in system daisy-chain configuration from unit to BAS controller and to other units, if applicable.
  - j. Network Wiring: Two wire RS-485.
  - k. VRF Module if Applicable:
    - The manufacturer shall provide an air handling unit with integral factory-supplied and installed controls specifically designed and programmed to integrate with the (LG/Daikin/Mitsubishi/ Samsung) 3rd party VRF kits.
    - (Daikin only) The manufacturer shall provide a controller compatible with the Daikin 'W' type controls.
    - Customer provided VRF sensor (if applicable) shall have a wire length of at least 14 ft.
2. Controls by others installed at AHU Manufacturer in AHU Manufacturer supplied standard Electrical Panel
  - a. Controller must fit the space/volume specified. Dimensions must be approved by

- AHU manufacturer prior to production release.
3. Controls by others field installed in AHU Manufacturer supplied standard Electrical Panel
    - b. Controller must fit the space/volume specified. Dimensions must be approved by AHU manufacturer prior to production release.
  4. Electrical panel, disconnects, controls and all wiring field installed. No electrical by AHU manufacturer

B. Sensors

1. The following sensors shall also be installed and pre-configured with the controller by the manufacturer: temperature sensors (supply, return, exhaust, outdoor & entering), wheel rotation sensor, dirty filters sensor, defrost sensor, hydronic coil frost protection sensor and electric heating high temperature limit sensor.
2. In constant air volume applications, independent pressure sensors shall monitor both supply and exhaust fans for constant airflow.
3. In variable air volume applications, independent pressure sensors shall monitor both supply and exhaust fans to maintain constant duct pressure.

## **PART 3      EXECUTION**

### **3.1      SOURCE QUALITY CONTROL**

- A. Run test at factory.

### **3.2      EXAMINATION**

- A. Examine areas and supporting structure to receive air handling units.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin installation until unacceptable conditions are corrected.

### **3.3      PREPARATION**

- A. Prepare surfaces where air handling units are to be mounted.
- B. Ensure surfaces are flat, level, plumb, and can support weight of energy recovery ventilators.

### **3.4      INSTALLATION**

- A. Install air handling units in accordance with industry standards, local codes, and manufacturer's instructions at locations indicated on the Drawings.
- B. Install air handling units in accordance with NFPA 70.
- C. Install air handling unit level, plumb, and secure.
- D. Do not expose electronic components to temperatures below 32 degrees F (0 degrees C) or above 122 degrees F (50 degrees C).

### **3.5      ADJUSTING**

- A. Adjust air handling units for proper operation in accordance with manufacturer's instructions.

### **3.6      DEMONSTRATION**

- A. Demonstration:
  - 1. Demonstrate that air handling units function properly in every respect.
  - 2. Perform demonstration at final system inspection by factory-trained and certified representative of manufacturer.
- B. Instruction and Training:
  - 1. Provide instruction and training of Owner's personnel as required for operation and maintenance of air handling units.
  - 2. Provide hands-on demonstrations of operation of system components and complete system, including user-level program changes and functions.
  - 3. Provide instruction and training by factory-trained and certified representative of

manufacturer.

### **3.7 PROTECTION**

- A. ASHRAE 62.1 Air Handling units shall be stretch wrapped to protect unit during shipping from manufacturer to customer mounting location
- B. Protect installed air handling units from damage during construction.

**END OF SECTION**