SECTION 15930 - AIR TERMINAL UNITS (Pre-purchased)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Variable Volume terminal units.
   2. Integral Heating Coils.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings which indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Include a schedule showing unique model designation, room location, model number, size, and accessories furnished.
   2. Wiring Diagrams: Power, signal, and control wiring.
   3. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 to 4 inch wg (250 to 1000 Pa)
   4. Manufacturer's Installation Instructions: Indicate support and hanging details, and service clearances required.

C. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Instructions for resetting minimum and maximum air volumes.
   2. Instructions for adjusting software set points.
   3. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant volume regulators

1.4 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air terminal units and are based on the specific system indicated. Refer to Division 01 Section "Quality Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for

intended use. Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004.

D. NFPA Compliance: Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

1.5 COORDINATION

A. Coordinate layout and installation of air terminal units and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

B. SINGLE DUCT VARIABLE VOLUME UNITS

Available Manufacturers:
1. Trane Co. (The); Worldwide Applied Systems Group.

C. Configuration: Ceiling mounted volume-damper assembly inside unit casing with hot water heating coils and control components located inside a protective metal shroud.

D. Casing: 22 gauge - 0.034-inch (0.85-mm) steel.
1. Casing Lining: 1-inch- (25-mm-) thick, coated, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive. Cover liner with 26 gauge – 0.018-inch (0.45-mm) sheet steel metal.
2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.
4. Access: Removable panels for access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket.
5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

E. Regulator Assembly: Extruded-aluminum or galvanized-steel components; key damper blades onto shaft with nylon-fitted pivot points located inside unit casing.
1. Automatic Flow-Control Assembly: Combined spring rates shall be matched for each volume-regulator size with machined dashpot for stable operation.
2. Factory-calibrated and field-adjustable assembly with shaft extension for connection to externally mounted control actuator.

F. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
   1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
   2. Damper Position: Normally open.

G. Hot-Water Heating Coil: Copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig; and factory installed.

H. DDC Controls: Single-package unitary controller and actuator specified in Division 15 Section "Instrumentation and Control for HVAC."

PART 3 - SEQUENCE OF OPERATION

3.1 LAB TEMPERATURE CONTROL

A. Should the room temperature rise above setpoint the VAV terminals shall be increased to cool the lab space. Should the room temperature drop below the setpoint, the VAV terminals shall be decreased to minimum position and still maintain (+) 0.025 inch W.G. controlled by a room differential pressure sensor relative to the adjacent corridors outside the Lab. Should the room temperature continue to drop, the VAV terminals shall be at minimum position and the reheat coil control valve shall modulate to maintain the room at setpoint.

3.2 BUILDING AUTOMATION SYSTEM INTERFACE

A. The room differential pressure sensor shall digitally interface to the Central Building Automation System (BAS) as provided by the Temperature Control Contractor. The Laboratory room differential pressure sensor shall be responsible to provide an interface device between the VAV terminals controls and the BAS, including standardized communications protocol software for either ModBus or BacNet, and data mapping tables as required by the BAS design.

B. The following Lab Control Parameters shall be transferred digitally to the BAS:
   1. Supply Airflow, CFM and setpoint
   2. Outdoor air CFM and set point.
   3. Lab differential pressure setpoint

C. The Temperature Controls Contractor shall be responsible to provide digital interface devices, drivers for interfacing with ModBus or BacNet protocols, software indigenous to the BAS, and graphic displays for the room differential pressure sensor at the central BAS station.

D. Hardwire interfacing of Lab Control Systems to BAS shall only be acceptable if:
   1. All parameters outlined in par. B above shall be transferred to the BAS.
   2. The Lab Control Contractor shall provide, in their Bid price, all additional equipment required on the part of the ATC for interface to the Lab systems, including ATC control panels.

3.3 SOURCE QUALITY CONTROL

A. Identification: Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

B. Verification of Performance: Rate air terminal units according to ARI 880.

PART 4 - EXECUTION

4.1 INSTALLATION – VAV BOXES

A. Install air terminal units level and plumb in accordance with manufacturer's instructions. Maintain sufficient clearance for normal service and maintenance.

B. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to minimum flow rate as specified.

C. Provide ceiling access doors or locate units above easily removable ceiling components.

D. Support units individually from structure. Do not support from adjacent ductwork.

4.2 CONNECTIONS

A. Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Install piping adjacent to air terminal units to allow service and maintenance.

D. Hot-Water Piping: In addition to requirements in Division 15 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

E. Connect ducts to air terminal units.

F. Connect wiring according to Division 16 Section "Conductors and Cables."

G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

4.3 FIELD QUALITY CONTROL

A. Retain first paragraph below to require a factory-authorized service representative to perform, or assist Contractor with, field inspections, tests, and adjustments. Retain one of two options to suit Project; delete both to require only an inspection before field testing.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect**,** test, and adjust field-assembled components and equipment installation, including connections**,** and to assist in field testing. Report results in writing.

C. Perform the following field tests and inspections and prepare test reports:
   1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
   2. Retain first subparagraph below for air terminal units with hot-water coils.
   3. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
   4. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

4.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions and do the following:
      a. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
      b. Verify that controls and control enclosure are accessible.
      c. Verify that control connections are complete.
      d. Verify that nameplate and identification tag are visible.
      e. Verify that controls respond to inputs as specified.

4.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air terminal units. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 15930