SECTION 23 36 00 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fan-powered air terminal units
2. Shutoff single-duct air terminal units.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated, include rated capacities, furnished specialties, sound-power ratings, and accessories.

B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. 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.

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

1.4 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 FAN-POWERED AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Anemostat; a Mestek Company.
2. Carnes.
3. Environmental Technologies, Inc.; Enviro-Air Div.
4. Krueger.

5. METALAIRE, Inc.; Metal Industries Inc.
6. Nailor Industries of Texas Inc.
7. Price Industries.
8. Titus.
9. Trane Co. (The); Worldwide Applied Systems Group.
10. Tuttle & Bailey.

B. Configuration: Volume-damper assembly and fan in series or in parallel arrangement inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.034 inch steel or 0.032 inch aluminum.

1. Casing Lining: [**1/2 inch**] [**3/4 inch**] [**1 inch**] thick, coated, fibrous glass duct liner complying with ASTM C 1071; secured with adhesive. [**Cover liner with nonporous foil.**] [**Cover liner with nonporous foil and perforated metal.**]

OR

2. Casing Lining: Adhesive attached, 3/4 inch thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame spread index of 25 and a maximum smoke developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
3. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
4. Air Outlet: S-slip and drive connections.
5. Access: Removable panels for access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.

D. 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.

E. Fan Section: Galvanized-steel plenum, with direct drive, forward curved fan with air filter and backdraft damper.

1. Motor: [**Multispeed**] [**ECM**]. Comply with requirements in Division 23 Section "Electrical Motors for Mechanical Equipment."

a. Speed Control: Infinitely adjustable with electronic controls.
b. Fan-Motor Assembly Isolation: Rubber isolators.

2. Air Filter: 1 inch thick, fiberglass throwaway.

F. Attenuator Section: 0.034 inch steel or 0.032 inch aluminum sheet metal.

1. Lining: [**1/2 inch**] [**3/4 inch**] [**1 inch**] thick, coated, fibrous glass duct liner complying with ASTM C 1071; secured with adhesive.[**Cover liner with nonporous foil.**][**Cover liner with nonporous foil and perforated metal.**]

OR

2. Lining: Adhesive attached, 3/4 inch- thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame spread index of 25 and a maximum smoke developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

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

OR

H. Electric Heating Coil: Slip-in-type, open coil design with integral control box factory wired and installed. Include the following features:

1. Primary and secondary overtemperature protection.
2. Nickel chrome 80/20 heating elements.
3. Fan interlock contacts.
4. Noninterlocking disconnect switch.
5. Fuses (for coils more than 48 A).
6. Mercury contactors.
7. Magnetic contactor for each step of control (for three phase coils).

I. Factory Mounted and Wired Controls: Electrical components shall be mounted in control box with removable cover. Incorporate single-point electrical connection to power source.

1. Control Transformer: Factory mounted for control voltage on electronic control units with terminal strip in control box for field wiring of thermostat and power source.
2. Wiring Terminations: Fan and controls to terminal strip, and terminal lugs shall match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
3. Disconnect Switch: Factory-mounted, fused type.

J. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

K. Pneumatic Controls: Damper operator and velocity controller shall be compatible with temperature controls specified in Division 23 Section “Direct Digital Control (DOC) System.”

1. Pneumatic Damper Operator: 3 to 13 psig spring range.
2. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static pressure variations up to 4-inch wg and shall have a multipoint velocity sensor at air inlet.

2.2 SHUTOFF SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Anemostat; a Mestek Company.
2. Carnes.
3. Environmental Technologies, Inc.; Enviro-Air Div.
4. Krueger.
5. METALAIRE, Inc.; Metal Industries Inc.
6. Nailor Industries of Texas Inc.
7. Price Industries.
8. Titus.
9. Trane Co. (The); Worldwide Applied Systems Group.
10. Tuttle & Bailey.

B. Configuration: Volume damper assembly inside unit casing with control components located inside a protective metal shroud.

C. Casing: 0.034 inch steel or 0.032 inch aluminum.

1. Casing Lining: [**1/2 inch**] [**3/4 inch**] [**1 inch**] thick, coated, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive. [**Cover liner with nonporous foil.**][**Cover liner with nonporous foil and perforated 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.

D. 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.

E. 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.

F. Attenuator Section: 0.034 inch steel or 0.032 inch aluminum sheet metal.

1. Lining: [**1/2 inch**] [**3/4 inch**] [**1 inch**] thick, coated, fibrous glass duct liner complying with ASTM C 1071; secured with adhesive.[**Cover liner with nonporous foil.**][**Cover liner with nonporous foil and perforated metal.**]

OR

2. Lining: Adhesive attached, 3/4 inch thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame spread index of 25 and a maximum smoke developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

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

OR

H. Electric Heating Coil: Slip-in-type, open coil design with integral control box factory wired and installed. Include the following features:

1. Primary and secondary overtemperature protection.
2. Nickel chrome 80/20 heating elements.
3. Airflow switch.
4. Noninterlocking disconnect switch.
5. Fuses (for coils more than 48 A).
6. Mercury contactors.
7. Magnetic contactor for each step of control (for three phase coils).

I. Pneumatic Controls: Damper operator and velocity controller shall be compatible with temperature controls specified in Division 23 Section “Direct Digital Control (DOC) System.”

1. Pneumatic Damper Operator: 3 to 13 psig spring range.
2. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static pressure variations up to 4-inch wg and shall have a multipoint velocity sensor at air inlet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

B. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

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

D. Heating Hot Water Piping: In addition to requirements in Division 23 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 according to Division 23 Section "Metal Ducts."

F. Ground units with electric heating coils according to Division 26 Section "Grounding and Bonding for Electrical Systems."

G. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

H. Cover air inlet and discharge openings while air terminal units are in storage and after installation prior to ductwork connections.

3.2 FIELD QUALITY CONTROL

A. 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. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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

END OF SECTION 23 36 00