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.

B. Meet the following performance requirements:

C. Structural Performance:

1. Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible". Refer to Section 23 00 10.

1.2 RELATED SECTIONS

A. Section 23 00 10 – Basic mechanical requirements, is an integral part of this section. Requirements and work indicated in 23 00 10 are not repeated in this Section.

1.3 COORDINATION

A. Coordinate work under provisions indicated in Section 23 00 10:

1.4 QUALIFICATIONS / QUALITY ASSURANCE

A. Conform to requirements indicated in Section 23 00 10.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2016, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements indicated in Section 23 00 10.

1.6 SUBMITTALS

A. Submit as required here in and under Section 23 00 10.

B. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.
2. Liners and adhesives.
3. Sealants and gaskets.

1.7 EXTRA MATERIALS

A. Furnish under provisions indicated in Section 23 00 10

B. Provide the following additional materials:

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   a. Fan-Powered-Unit Filters: Furnish one spare filter for each filter installed.

1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions indicated in Section 23 00 10.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit under provisions indicated in Section 23 00 10.

B. 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.

1.10 WARRANTY

A. Provide under provisions indicated in Section 23 00 10.

PART 2 - PRODUCTS

2.1 SERIES FAN-POWERED AIR TERMINAL UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Environmental Technologies, Inc.
2. Nailor Industries Inc.
3. Price Industries.
4. Titus.

B. Configuration: Volume-damper assembly and fan in series arrangement inside unit casing with control components inside a protective metal shroud for installation above a ceiling.

C. Casing: 0.034-inch double wall.

1. Casing Lining: Adhesive attached, 1/2-inch- (13-mm) thick, coated, fibrous-glass duct liner complying with ASTM C 1071, 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.
   a. Cover liner with nonporous foil and perforated metal.
2. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
5. Fan: Forward Curved, dynamically balanced, galvanized wheel.
6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2016.
7. Radiated Sound Damper.

D. Volume Damper: Galvanized steel with flow-sensing ring and peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch inlet static pressure.
2. Damper Position: Normally open

E. Air terminals shall be equipped with a multi-point, center-averaging or multiple point flow sensing ring type air flow sensor. The airflow sensor shall be designed to provide a differential pressure signal which is amplified 2.5 times the normal velocity pressure over the range or a minimum of 0.03” wg at 500 FPM.

F. Motor:

1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
2. Type: Electronically Commutated Motor (ECM) brushless DC controlled by an integral inverter controller.
3. Fan-Motor Assembly Isolation: Rubber isolators.
4. Efficiency: Premium efficient.
5. Motor Speed:
   a. Speed Control: Infinitely adjustable through a Pulse Width Modulating (PWM) controller designed for compatibility with the EMC motor. The speed controller shall have terminals for field verification of fan capacity with a digital volt meter. A calibration graph shall be supplied for each fan powered terminal unit indicating fan CFM verses DC volts.

G. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Material: Pleated cotton-polyester media having 90 percent arrestance and 7 MERV.
2. Thickness: 2 inches.

H. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.

1. Stage(s): Proportional (SSR) heater control.
2. Single point electrical connection.
3. Access door interlocked disconnect switch.
4. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
5. Nickel chrome 80/20 heating elements.
6. Airflow switch for proof of airflow.
7. Fan interlock contacts.
8. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
9. Mercury contactors.
10. Magnetic contactor for each step of control (for three-phase coils).
11. Provide a 480Volt/3 ph./60 to 277 Volt/1 ph/60 transformer with single feed to serve fan motor at 277volt and electric heating coil at 480 volt.

I. DDC Controls: Furnished by DDC system manufacturer and installed at factory terminal unit manufacturer. Control devices shall be compatible with temperature controls specified in Division 23 Section "" “Building Monitoring System” and shall have the following features:

1. Occupied and unoccupied operating mode.
2. Remote reset of airflow or temperature set points.
3. Adjusting and monitoring with portable terminal.
4. Communication with temperature-control system specified in Division 23 Section ”Building Monitoring System”.

2.2 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

C. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test assembled air terminal units according to ARI 880.

1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, and ARI certification seal.

PART 3 - EXECUTION

3.1 INSTALLATION

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

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

C. Terminal box manufacturer shall factory mount terminal box controller, damper actuator, velocity pressure transducer, and control transformer furnished by Division 23 Section Controls Contractor. Controls shall be installed in accordance with control manufacturer's recommendations.

1. Install pneumatic tubing from the terminal box airflow sensor to the terminal box controller transducer.

3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Building Attachments: Structural-steel fasteners appropriate for construction materials to which hangers are being attached.

C. Hangers Exposed to View: Threaded rod and angle or channel supports.

D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 CONNECTIONS

A. Make connections to air terminal units with flexible connectors complying with requirements in Division 23 Section "Air Duct Accessories."

3.4 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

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.

E. Air terminal unit will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.6 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.
2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION