



SECTION 23 36 00 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Constant volume terminal units.
2. Variable volume terminal units.
3. Fan powered terminal units.

NOTE: Terminal Units shall be provided with electronic Direct Digital Controller with BACnet open protocol communications and electronic actuators for damper and reheat coil control valve.

1.2 REFERENCES

A. American Refrigeration Institute:

1. ARI 880 - Air Terminals.
2. ARI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

D. Underwriters Laboratories Inc.:

1. UL 181 - Factory-Made Air Ducts and Connectors.

E. American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

1. ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality.

1.3 SUBMITTALS

- A. Product Data: Submit data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings indicating airflow, static pressure, heating coil capacity and NC designation. Include electrical characteristics and connection requirements. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 inch to 4 inches WG.
- B. Manufacturer's Installation Instructions: Submit support and hanging details, and service clearances required.



1.4 CLOSEOUT SUBMITTALS

- A. Execution and Closeout Requirements:
- B. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant volume regulators.

1.5 WARRANTY

- A. Minimum one-year warranty.

PART 2 – PRODUCTS

2.1 SINGLE DUCT CONSTANT AND VARIABLE VOLUME AIR TERMINAL UNITS

- A. Manufacturers:
 - 1. **Anemostat.**
 - 2. **Price**
 - 3. **Titus.**
- B. Product Description: Variable air volume terminal units for connection to central air systems, with electronic controls and hot water heating coils.
- C. Identification: Furnish each air terminal unit with identification label and airflow indicator. Include unit nominal airflow, maximum factory-set airflow and minimum factory-set airflow and coil type.
- D. Basic Assembly:
 - 1. Casings: Minimum 22 gauge galvanized steel.
 - 2. Lining: Minimum 3/4 inch thick neoprene or vinyl coated glass fiber insulation, 1.5 lb./cu ft density, meeting NFPA 90A requirements and UL 181 erosion requirements.
 - 3. Plenum Air Outlets: S slip-and-drive connections.
- E. Basic Unit:
 - 1. Configuration: Air volume damper assembly inside unit casing. Locate control components inside protective metal shroud.
 - 2. Volume Damper: Construct of galvanized steel with peripheral gasket and self-lubricating bearings; maximum damper leakage: 2 percent of design air flow at 3 inches inlet static pressure.
- F. Attenuation Section: Line attenuation sections with 1 or 2 inches thick insulation.
- G. Round Outlet: Discharge collar matching inlet size.



H. Hot Water Heating Coil:

1. Construction: 1/2 inch copper tube mechanically expanded into aluminum plate fins, leak tested under water to 200 psig pressure, factory installed.
2. All coils shall be minimum 2-pass.

2.2 FAN POWERED VARIABLE VOLUME UNITS

A. Manufacturers:

1. **Anemostat.**
2. **Price.**
3. **Titus.**

B. Product Description: Variable air volume terminals for connection to central air systems with electronic controls and hot water heating coils.

C. Identification: Furnish each air terminal unit with identification label and airflow indicator. Include unit nominal airflow, maximum factory-set airflow and minimum factory-set airflow and coil type.

D. Basic Assembly:

1. Casings: Minimum 22 gauge galvanized steel.
2. Lining: Minimum 3/4 inch thick neoprene or vinyl coated glass fiber insulation, 1.5 lb./cu ft density, meeting NFPA 90A requirements and UL 181 erosion requirements.
3. Plenum Air Outlets: S-slip and drive connections.

E. Basic Unit:

1. Configuration: Air volume damper assembly and fan in series or parallel arrangement inside unit casing. Locate control components inside protective metal shroud.
2. Volume Damper: Construct of galvanized steel with peripheral gasket and self-lubricating bearings; maximum damper leakage: 2 percent of design air flow at 3 inches inlet static pressure.

F. Fan Assembly:

1. Fan: Forward curved centrifugal type with direct drive permanent-split-capacitor type, thermally protected motor.
2. Speed Control: Infinitely adjustable with electric/pneumatic and electronic controls.
3. Isolation: Fan/motor assembly on rubber isolators.

G. Wiring:

1. Factory mount and wire controls. Mount electrical components in control box with removable cover. Incorporate single point electrical connection to power source.



2. Factory mount transformer for control voltage on electric and electronic control units. Furnish terminal strip in control box for field wiring of thermostat and power source.
 3. Wiring Terminations: Wire fan and controls to terminal strip. Furnish terminal lugs to match branch-circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box.
 4. Disconnect Switch: Factory mount disconnect switch.
- H. Variable Air Volume and Constant Air Volume terminal air units shall be supplied with the factory installed BacNet controllers:
1. The terminals shall be equipped with pressure independent direct digital controls (DDC) supplied and mounted by the terminal unit manufacturer. The DDC controls shall be installed and commissioned by the controls contractor.
 2. Controls shall be compatible with pneumatic inlet velocity sensor supplied by the terminal's manufacturer. The sensor shall be multi point center averaging type with four measuring ports parallel to the take off point of the sensor. Sensors with measuring ports in series are not acceptable. The sensor must provide a minimum differential pressure signal of 0.03 WG at the inlet velocity of 500 fpm.
 3. Controls shall be factory set for unit size and the scheduled minimum and maximum flow rates. Controller shall be BACnet compliant and has to be listed and stamped by the BACnet Testing Laboratory.
 4. Controls shall be supplied with a digital thermostat that also serves as the commissioning interface to the terminal unit mounting controller.
 5. The terminal air unit manufacturer shall provide Class II, 24 VAC transformer and disconnect switch. Actuator shall be direct connection shaft mount type without linkage. All controls shall be installed in approved NEMA1 sheet metal enclosure.
 6. Manufacturers:
 - a. **Titus**
 - b. **Neptronic**
 - c. **KMC Controls**

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install ceiling access doors or locate units above easily removable ceiling components.
- B. Support units individually from structure. Do not support from adjacent ductwork.

END OF SECTION 23 36 00