

SECTION 233600 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 23 Section "Common Work Results for HVAC"
 - 2. Division 23 Controls Section for control devices installed on air terminals.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Single-duct air terminals.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated.
- B. Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate requirements of air terminals and are based on specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- B. Listing and Labeling: Provide electrically operated air terminals specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- C. Testing Requirements: Test and rate air terminals according to ARI 880, "Industry Standard for Air Terminals."
- D. Identification: Label each air terminal with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

- E. NFPA Compliance: Install air terminals according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- F. Comply with NFPA 70 for electrical components and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide air terminals by one of the following:
 - 1. Trane
 - 2. Carrier Corp.
 - 3. Environmental Technologies.
 - 4. Price
 - 5. Metal Aire
 - 6. Krueger
- B. All terminal units shall be ARI 880 - 98 certified and UL Listed.

2.2 SINGLE-DUCT AIR TERMINALS

- A. Casings: 22 gauge galvanized steel. Maximum casing leakage: 7 cfm at 1-inch wg inlet static pressure.
- B. The interior surface of the unit casing shall be acoustically and thermally lined with 3/4-inch, 1.5 lb/ft³ fiberglass insulation. The insulation shall meet NFPA-90A, UL 723 (25/50 flame-smoke), UL 181 (mold growth & humidity), ASTM E84 (25/50 flame-smoke), ASTM C 665 (fungi resistance) standards. The insulation shall have an R-Value of 3.2.
- C. The air inlet connection shall be an 18 gauge galvanized steel cylinder sized to fit standard round duct. A multiple point, averaging flow sensing ring shall be provided with balancing taps for measuring within +/- 5% of unit cataloged airflow. Airflow versus pressure differential calibration chart shall be provided. The damper blade shall be constructed of a closed cell foam seal mechanically locked between two 22 gauge galvanized steel disks. The damper blade assembly shall be connected to a cast zinc shaft supported by self lubricating bearings. The shaft shall be cast with a damper position indicator. The valve assembly shall include a mechanical stop to prevent over stroking. At 4.0" wg air valve leakage does not exceed 1% of cataloged airflow.
- D. Accessories
 - 1. Hot Water Coil: Factory mounted on outlet. Provide full fin collars provided for accurate fin spacing and maximum fin-tube contact. The seamless copper tubes shall be mechanically expanded into the fin collars. Coils shall be proof tested at 450-psi and leak tested at 300-psi air pressure under water. Coil connections shall be sweat with left hand or right hand coil connections as per field constraints. Coils shall be provided with an access for cleaning.
 - 2. A 50 VA transformer shall be factory mounted in an enclosure with 7/8" knockouts to provide 24 VAC for controls.

E. Controls

1. The terminals will have pressure independent direct digital controls supplied and mounted by the control contractor.
2. Terminals shall be furnished with a pneumatic inlet velocity sensor. The sensor shall be multi-point center averaging type, with a minimum of four measuring ports parallel to the take-off point from 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 an inlet velocity of 500 fpm.
3. Flow measuring taps and flow curves shall be supplied with each terminal for field balancing airflow.
4. All pneumatic tubing shall be UL listed fire retardant (FR) type.
5. Each terminal shall be equipped with labeling showing unit location, size, and scheduled cfm.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install air terminals level and plumb, according to manufacturer's written instructions, rough-in drawings, original design, and referenced standards.
- B. Allow adequate clearance to meet NEC on control box side of unit to meet NEC.
- C. Support in accordance with SMACNA and manufacturer recommendations.
- D. Connect ductwork to air terminals according to Division 23 ductwork Sections. Slip each inlet duct over the inlet collar of the terminal. Fasten and seal the connection airtight. The diameter of the inlet duct must be equal to the listed size of the terminal; e.g. a duct that actually measures 8 inches must be fitted to a size 8 terminal.
- E. Inlet and outlet duct must be installed in accordance with SMACNA guidelines. Provide a minimum of 2.5 equivalent duct diameters of straight duct at the inlet.

3.2 CONNECTIONS

- A. Install piping adjacent to air terminals to allow service and maintenance.
- B. 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.
- C. Electrical: Comply with applicable requirements in Division 16 Sections. Ground equipment. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

3.5 COMMISSIONING

- A. Verify that installation of each air terminal is according to the Contract Documents.
- B. Check that inlet duct connections are as recommended by air terminal manufacturer to achieve proper performance.
- C. Check that controls and control enclosure are accessible.
- D. Verify that control connections are complete.
- E. Check that nameplate and identification tag are visible.
- F. Verify that controls respond to inputs as specified.

END OF SECTION 233600