

SECTION 15933 - AIR TERMINALS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of air terminals work required by this section is indicated on drawings and schedules, and by requirements of this section.
- B. Types of air terminals specified in this section include the following:
 - 1. Central Air Terminals
 - a. Shutoff Single Duct
 - b. Reheat
 - 2. Fan Powered Terminals
 - a. Series
 - b. Parallel
- C. Refer to other Division 15 sections for related work in addition to the requirements of this section.
- D. Refer to Division-16 sections for the following work; not work of this section.
 - 1. Power supply wiring from power source to power connection on air terminals. Include disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
- E. Provide the following electrical work as work of this section, complying with requirements of Division-16 sections:
 - 1. Control wiring between field-installed controls and air terminals.
 - a. Control wiring specified as work of Division-15 for Automatic Temperature Controls is work of that section.

1.2 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of air terminals with characteristics, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. ADC Compliance: Provide air terminals, which have been tested and rated in accordance with ADC standards, and bear ADC Seal.
 - 2. ARI Compliance: Provide air terminals, which have been tested and rated in accordance with ARI 880 "Industry Standard for Air Terminals" and bear ARI certification seal. Hot water coils shall be tested and rated in accordance with ARI Standard 410.
 - 3. NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".

1.3 SUBMITTALS:

- A. **Product Data:** Submit manufacturer's technical product data, including performance data for each size and type of air terminal furnished; schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished; and installation and start-up instructions.
- B. **Shop Drawings:** Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.
- C. **Wiring Diagrams:** Submit ladder-type wiring diagrams for electric power and control components, clearly indicating required field electrical connections.
- D. **Record Drawings:** At project closeout, submit record drawings of installed systems products, in accordance with requirements of Division 15.
- E. **Maintenance Data:** Submit maintenance data and parts list for each type of air terminal; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and maintenance data in maintenance manual; in accordance with requirements of Division 15.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver air terminals wrapped in factory-fabricated fiberboard type containers. Identify on outside of container type of air terminal and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in boxes.
- B. Store air terminals in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS**2.1 MANUFACTURERS:**

- A. **Manufacturer:** Subject to compliance with requirements, provide products by one of the following:
 - 1. **Air Terminals:**
 - a. Titus Products Div.; Philips Industries, Inc.
 - b. Anemostat Products Div.; Dynamics Corp. of America.
 - c. Tempmaster
 - d. Carnes Co.
 - e. Corp.; Sub. of United Technologies Corp.
 - f. Trane (The) Co.
 - g. Metal-Aire
 - h. Krueger

2.2 AIR TERMINALS:

- A. **General:** Provide factory-fabricated and tested air terminals as indicated, selected with performance characteristics which match or exceed those indicated on schedule.

- B. Air terminal units shall be low pressure drop, single duct/ ~~dual-duct~~ throttling type pressure independent and suitable for use in low/medium pressure variable volume [and] constant volume/dual duct air distribution systems.
- C. Casing shall be minimum 22 gauge galvanized steel construction with internal acoustical coated 1/2" thick, 1-1/2 lb. density, fiberglass insulation and inlet and outlet duct connections. Provide gasketed and insulated access doors for air terminals with internally mounted serviceable components, including actuators and fan motors.
1. Casing shall be insulated with 1/2", 1-1/2 lb. reinforced foil faced insulation. All edges shall be folded and tucked or protected by sheet metal nosing to isolate all glass fibers from the air stream.

SPEC WRITER'S NOTE: Adds \$62 to a 10" diameter terminal (8/96)

- D. Internal damper blade shall be extruded aluminum or 18 gauge steel with keyed fit shaft and nylon bushing. Damper shall seal against gasketed stops maximum 2% leakage at 3.0" S.P. All mechanical parts shall be galvanized or non-ferrous. Alternate damper design as produced by the Trane Company as acceptable.
- E. Hot water heating coils shall be designed for 200 psig maximum working pressure and 200°F maximum operating temperature. Coil shall be serpentine-type, constructed of 1/2" O.D. copper tubes mechanically bonded to aluminum fins; galvanized steel casing.

OR

Electric heating coils shall be constructed of electric resistance heating elements in galvanized steel casing with a NEMA 1 control box, a hinged access door and factory wiring. Provide over-temperature protection, differential pressure air flow switch, door interlocking disconnect, magnetic contactors and UL listing as duct heater. Provide a minimum of 2 stages for heaters 3 KW and over. Heater shall be located upstream of primary air damper to allow well developed flow across the elements and to provide a strong signal for the air flow proof switch.

EDIT NOTE: Heater upstream of damper is not done by all manufacturers, but is a good idea. Titus- No Enviro Tec-Yes.

EDIT NOTE: Verify the need for access door in terminal casing with Owner and ASHRAE Standards.

- F. Provide between terminal casing and reheat coil, factory-installed framed duct access door complete with quarter-turn quick release fasteners.
- G. Provide label on each air terminal unit, indicating plan designation, unit size, cfm range and settings and calibration curve.
- H. Provide a pressure independent pneumatic cross or ring-shaped flow sensor with velocity pressure pickup points for measuring inlet airflow. The sensor shall maintain control accuracy with the same size inlet duct in any configuration. Single point hot wire anemometer or straight line pneumatic sensors are not acceptable. Provide gauge ports in flow sensor tubing.

2.3 FAN POWERED TERMINALS:

In addition to the above, comply with the following:

- A. Fan Section: Provide galvanized steel plenum, acoustically lined, housing forward curved fan with belt or direct driven permanent split capacitor motor with SCR speed control and fan contactor factory wired to power and control terminal blocks in a sheet metal enclosure. Provide air filter and inlet plenum boot.

SPEC WRITER NOTE: See insulation options above.

1. For series, constant volume terminals, the fan shall be mounted in a common compartment with the primary air damper. The fan shall operate continuously drawing a mixture of plenum air and primary air.
2. For parallel, variable air volume terminals the fan shall be mounted in a separate compartment. The fan shall operate intermittently, drawing only plenum air. Provide a back draft damper to prevent primary air from bypassing to the plenum.

- B. Heating coil shall be located in the discharge of the terminal, not in the plenum air inlet.

2.4 CONTROLS:

SPEC WRITER NOTE: Use below for all DDC jobs and select pneumatic jobs.

- A. Air terminal unit manufacturer shall mount DDC controller and pneumatic actuator provided by temperature control manufacturer. See Section 15971/15973.
- B. Coordinate spring range P/E settings and control action with devices provided under Section 15973 and Sequence of Control specified in Section 15975.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine areas and conditions under which air terminals are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 COORDINATION:

- A. The contractor is responsible for determining the position of controls, actuators, and access. Coordinate each air terminal's position with building elements, piping, conduit, ductwork and other items, order left/right hand units as required and inform all other trades as required. Relocate interfering items or terminal as required to provide proper access if not coordinated beforehand.

3.3 INSTALLATION OF AIR TERMINALS:

- A. General: Install air terminals as indicated, and in accordance with manufacturer's installation instructions.
- B. Location: Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

- C. Duct Connections: Connect ductwork to air terminals in accordance with Division-15 ductwork sections.
- 3.4 FIELD QUALITY CONTROL:
- A. Upon completion of installation and prior to initial operation, test and demonstrate that air terminals, and duct connections to air terminals, are leak-tight.
 - B. Repair or replace air terminals and duct connections as required to eliminate leaks, and retest to demonstrate compliance.
- 3.5 CLEANING:
- A. Clean exposed factory-finished surfaces. Repair any marred or scratched surfaces with manufacturers touch-up paint.
- 3.6 BALANCING:
- A. See Section 15990. Balancing contractor shall set all air quantity limits, and shall not rely on any factory calibration. Report air quantity as measured by the air terminals velocity pressure pick up, in addition to pitot traverses and outlet readings.

END OF SECTION 15933