

SECTION 23 36 00 - 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes fan-powered and shutoff type variable air volume terminal units.

1.3 SUBMITTALS

- A. Exceptions: Shop drawing submittals are required to include a listing of any and all exceptions to the requirements indicated in this specification and on the drawings. If no exceptions are taken the submittal shall indicate this. Submittals that do not have this information will be returned without review.
- B. Provide product data for Air Terminal Units including rated capacities. Include a listing of any required specialties, sound-power ratings, and accessories.
- C. Shop Drawings: For all air terminal units provide a schedule indicating performance data required for a proper evaluation. Include drawings indicating the physical size and weight of all units. For fan-powered units provide wiring diagrams.
- D. Submittals for all variable air volume units will require a coordination review by the HVAC Controls manufacturer/installer prior to submission to the Engineer. Refer to Section 23 09 00.
- E. Provide Operation and Maintenance data for all air terminal units.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain all terminal units through one source from a single manufacturer, regularly engaged in production of Air Terminal Units.

1.5 WARRANTY

- A. Provide written warranty indicating all terminal units and components will be warranted for a period of 1 year from the date of substantial completion. The warranty will include all parts, materials and labor for replacement of any of the unit's components that fail in materials and/or workmanship within the warranty period.

1.6 EXTRA MATERIALS

- A. In addition to the filter required for all fan powered terminal units, provide (one/two) extra set of filters for all fan powered units to be installed on the project.

PART 2 - PRODUCTS

2.1 FAN-POWERED AIR TERMINAL UNITS

- A. Subject to compliance with all requirements provide Fan Powered Air Terminals manufactured by Carrier which is the Basis of Design Equipment.
- B. Subject to review, terminal units meeting the full requirements of the specifications and manufactured by the following will be considered:
 - 1. Johnson Controls.
 - 2. Trane.
 - 3. Nailor Industries Inc.
 - 4. Price Industries.
 - 5. Titus.
- C. Manufacturers other than the Basis of Design manufacturer shall carefully review the contract drawings, prior to bidding, to verify the equipment will meet all requirements including installation clearances and electrical characteristics. When necessary, the contractor shall provide modifications to the ductwork and / or piping to accommodate terminal units that may have different connection locations than the Basis of Design Equipment. Any required modifications shall be included in the contractor's bid and shall be indicated on the Coordination Drawings prepared by the Contractor.
- D. DDC Controller: provide microprocessor based terminal unit controller to provide accurate, pressure-independent control through the use of proportional integral control algorithm and direct digital control technology.
- E. Casing: provide minimum 22-gauge galvanized steel casing with filter housing.
- F. Casing Lining: Provide 1-inch x 1.0 lb/ft³ foil-faced insulation with an R value of 3.8. Insulation to be UL listed and meet the requirements of NFPA-90A and UL 181 standards. There are to be no exposed edges of insulation.
- G. Primary Air Valve Inlet: construct of minimum 18-gauge galvanized steel cylinder sized to fit round ducts. Provide a multiple port averaging flow sensing ring with balancing taps for measuring +/- 5% of the unit airflow. Provide 22-gauge galvanized steel damper blade with foam seals, steel shaft and self-lubricating bearings. Provide damper position indicator on the steel shaft. Valve leakage shall not exceed 1% of cataloged air flow at 4.0 in. w.g.
- H. Fan Motor: provide electrically commutated motor.
- I. Disconnect Switch: provide toggle type disconnect.
- J. Outlet: Provide flanged connection.
- K. Filters: Provide 1" MERV 13 filters.
- L. Access: Provide removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
- M. Hot-Water Heating Coil: Provide 1 or 2 row coil as required to meet the performance indicated on the drawings. Coil to have copper tubes mechanically expanded into aluminum-plate fins. Coils to be proof tested at 450 psig and leak tested underwater to 300 psig. Provide brazed coil connections.

2.2 SHUTOFF AIR TERMINAL UNITS

- A. Subject to compliance with all requirements provide Shutoff Air Terminals manufactured by Carrier which is the Basis of Design Equipment.
- B. Subject to review, terminal units meeting the full requirements of the specifications and manufactured by the following will be considered:
 - 1. Trane
 - 2. Johnson Controls.
 - 3. Nailor Industries Inc.
 - 4. Price Industries.
 - 5. Titus.
- C. Manufacturers other than the Basis of Design manufacturer shall carefully review the contract drawings, prior to bidding, to verify the equipment will meet all requirements including installation clearances and electrical characteristics. When necessary, the contractor shall provide modifications to the ductwork and / or piping to accommodate terminal units that may have different connection locations that differ from the Basis of Design Equipment. Any required modifications shall be indicated on the Coordination Drawings prepared by the Contractor.
- D. DDC Controller: provide microprocessor based terminal unit controller to provide accurate, pressure-independent control through the use of proportional integral control algorithm and direct digital control technology.
- E. Casing: provide minimum 22-gauge galvanized steel casing with filter housing.
- F. Casing Lining: Provide 1-inch x 1.0 lb/ft³ foil-faced insulation with an R value of 3.8. Insulation to be UL listed and meet the requirements of NFPA-90A and UL 181 standards. There are to be no exposed edges of insulation.
- G. Primary Air Valve Inlet: construct of minimum 18-gauge galvanized steel cylinder sized to fit round ducts. Provide a multiple port averaging flow sensing ring with balancing taps for measuring +/- 5% of the unit airflow. Provide 22-gauge galvanized steel damper blade with foam seals, steel shaft and self-lubricating bearings. Provide damper position indicator on the steel shaft. Valve leakage shall not exceed 1% of cataloged air flow at 4.0 in. w.g.
- H. Outlet: Provide s-slip or flanged connection.
- I. Where indicated on the drawings provide a factory installed and insulated galvanized sheet metal outlet plenum attached to the terminal unit casing. Provide circular openings in the plenum with outlet dampers. Refer to the drawings for the number of plenum openings required for each unit.
- J. Access: Provide removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
- K. Hot-Water Heating Coil: Provide 1 or 2 row coil as required to meet the performance indicated on the drawings. Coil to have copper tubes mechanically expanded into aluminum-plate fins. Coils to be proof tested at 450 psig and leak tested underwater to 300 psig. Provide brazed coil connections.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all air terminal units level and plumb with sufficient clearance for normal service and maintenance and filter replacement for fan powered boxes. Provide supports as required and indicated in the manufacturer's installation manuals.
- B. Field conversion of any air terminal unit due to ordering the wrong piping connections will not be permitted.
- C. Install piping adjacent to air terminal unit to allow service and maintenance.
- D. Hydronic Piping: provide connections to the inlet of heating coils to include shutoff valve, strainer and union. Outlet connections to include union, control valve, balancing valve and shutoff valve.
- E. Connect ducts to air terminal units as required.
- F. Coordinate control power requirements with BMS contractor. Provide all 120v power, control power, and transformers as required. See specification section 23 09 00 for additional requirements.
- G. Insulate the hydronic duct coil portion of the terminal units per the requirements indicates in Specification Section 23 07 00.
- H. Filters: Provide a filter at all fan powered terminal units. Refer to drawings for filter locations which could be in a return grille or installed at the terminal unit return connection. Where filters are to be installed at the terminal unit provide a filter frame or multiple clip type attachments to prevent filter from being displaced during the fan powered box operation.
 - 1. At the direction of the Owner's Representative the contractor shall remove and dispose of filters from the fan powered terminal units and install a new filter obtained from the Extra Materials required in Part 1 of this specification. If additional filter installation is not required, forward all filters to the owner as extra stock, at the completion of the project.

3.2 IDENTIFICATION

- A. The location of all variable volume units shall be indicated by locator tags on the ceiling tile. Provide equipment locator tags in a color suitable to the owner. Tags to be push tack type with 7/8" diameter head as manufactured by Marketing Services Inc. or equal.

3.3 FIELD QUALITY CONTROL

- A. Clean all units internally, on completion of installation, according to manufacturer's written instructions. Clean interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face.
- B. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE AND DEMONSTRATION

- A. Perform startup service complying with the requirements of the manufacturer's instructions.

- B. Provide training to Owner's personnel on the methods to adjust, operate, and maintain air terminal units.

END OF SECTION 23 36 00