

Suggested Specifications

Price Dual Duct Terminal Units

Division 23 – Heating, Ventilating, and Air Conditioning

Section 23 3600 – Air Terminal Units

The following specification is for a defined application. Price would be pleased to assist in developing a specification for your specific need.

PART 1 – GENERAL

1.01 Section Includes

- A. Dual-duct terminal units.

1.02 Related Requirements

- A. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment.
- B. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- C. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.
- D. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- E. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Thermostats and actuators.
- F. Section 23 09 23 - Direct-Digital Control System for HVAC.
- G. Section 23 09 43 - Pneumatic Control System for HVAC.
- H. Section 23 09 93 - Sequence of Operations for HVAC Controls.
- I. Section 23 31 00 - HVAC Ducts and Casings.
- J. Section 23 33 00 - Air Duct Accessories.
- K. Section 23 37 00 - Air Outlets and Inlets.
- L. Section 23 82 00 - Convection Heating and Cooling Units: Air coils.
- M. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 Reference Standards

- A. All referenced standards and recommended practices in this section pertain to the most recent publication thereof, including all addenda and errata.
- B. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils.
- C. AHRI 880 - Performance Rating of Air Terminals.
- D. AHRI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets, Appendix E.
- E. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- F. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality.
- G. ASHRAE 130 - Methods of Testing for Rating Ducted Air Terminal Units.
- H. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
- I. ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- K. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements.
- L. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- M. NFPA 70 - National Electrical Code.
- N. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association.
- O. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
- P. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Underwriters Laboratories Inc.

1.04 Administrative Requirements

- A. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data shall be provided with data indicating configuration, general assembly, and materials used in fabrication, including catalog performance ratings that indicate airflow, static pressure, NC designation, electrical characteristics, and connection requirements.
- C. Shop Drawings shall indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
 - 1. Manufacturer shall include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures from 1 to 4 inch water gauge.
- D. Certificates shall be issued to certify that the air coil capacities, pressure drops, and selection procedures meet or exceed specified requirements or coils are tested and rated in accordance with AHRI 410.

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- E. Manufacturer's Installation Instructions shall indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- F. Project Record Documents shall record actual locations of units and controls components and locations of access doors.
- G. Operation and Maintenance Data shall include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.
- H. Manufacturer's warranty shall be submitted and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials shall be furnished for the Owner's use in maintenance of the project.

1.06 Quality Assurance

- A. Manufacturer Qualifications shall be specified in this section, with minimum ten years of documented experience.
- B. Product Listing Organization Qualifications: The manufacturer shall be listed with an organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 Warranty

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide 18 month manufacturer warranty from date of shipment for air terminal units, integral sound attenuators, integral heating coils, and integral controls.

PART 2 – PRODUCTS

2.01 Dual-Duct Units

- A. Basis of Design: Price Industries, Inc.
 - 1. Variable-Volume, Non-mixing Dual-Duct Terminal Unit: DDV (direct digital controls).
- B. Performance Requirements:
 - 1. The assemblies shall be pressure independent and shall reset to any airflow between zero and the maximum cataloged air volume. Sound ratings of air distribution assemblies: Not to exceed ____ NC at ____ inches water gauge inlet static pressure, with a downstream static pressure of ____ inches water gauge.
 - 1. Use attenuation values found in AHRI 885.
- C. General:
 - 1. The terminal units shall be factory-assembled, AHRI 880 rated and bearing the AHRI seal for an air volume control terminal with damper assembly and flow sensor.
- D. Unit Casing:
 - 1. The unit casing shall be constructed of a minimum 22 gauge, 0.032 inch (0.81 mm) galvanized steel.
 - a. The casing shall be assembled with longitudinal lock seam construction.
 - 2. Air Inlet Collar: Manufacturer shall provide round inlet collars, suitable for standard flexible duct sizes.
 - 3. Unit Discharge: Manufacturer shall provide rectangular unit discharges with slip-and-drive connections.
 - 4. Liners:
 - a. Standard:
 - 1. Fiberglass Liner - FG.
 - a) Insulation shall comply with the requirements of UL 181 (erosion), ASTM C1338 (fungi resistance), ASHRAE 62.1, and ASTM C1071, having a maximum flame/smoke spread of 25/50 for both the insulation and the adhesive when tested in accordance with ASTM E84.
 - b) The insulation shall be secured with adhesive.
 - c) Insulation edges exposed to the airstream shall be coated with NFPA 90A approved sealant.
 - d) Insulation thickness shall be (**select one**):
 - i. 1/2 inch (13 mm) thick, R-value of 2.1.
 - ii. 3/4 inch (19 mm) thick, R-value of 3.2.
 - iii. 1 inch (25 mm) thick, R-value of 4.1.
 - b. Optional:
 - 1) Fiber-Free Foam Insulation - FF.
 - a) Insulation shall comply with the requirements of UL 181 (erosion, mold growth and humidity) and ASHRAE 62.1, and shall have a maximum flame/smoke spread of 25/50 for both the insulation and the adhesive when tested in accordance with ASTM E84.
 - b) The insulation shall be secured with adhesive.
 - c) Insulation thickness shall be (**select one**):
 - i. 1/2 inch (13 mm) thick, R-value of 2.0.
 - ii. 3/4 inch (19 mm) thick, R-value of 3.0.

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iii. 1 inch (25 mm) thick, R-value of 4.0.

2) Foil Board Liner System - FB.

- a) Insulation shall comply with the requirements of UL 181 (erosion, mold growth and humidity) and ASHRAE 62.1, and shall have a maximum flame/smoke spread of 25/50 for both the insulation and the adhesive when tested in accordance with ASTM E84.
- b) The insulation shall be secured with adhesive.
- c) Insulation edges exposed to airstream shall be coated with NFPA 90A approved sealant.
- d) Insulation thickness shall be **(select one)**
 - i. 5/8 inch (16 mm) thick, R-value of 2.6.
 - ii. 1 inch (25 mm) thick, R-value of 4.2.

E. Sound Attenuator:

- 1. Manufacturer shall provide a close-coupled sound attenuator or silencer, as required, to meet scheduled acoustical performance requirements.

F. Damper Assembly:

- 1. The damper assembly shall be heavy-gauge, galvanized steel with a solid shaft rotating in bearings.
- 2. The damper shaft shall incorporate a visual position indicator etched into the end of the damper shaft to clearly indicate damper position over the full range of 90 degrees.
 - a. The damper shaft shall be mounted on the [left], [right], [top], or [bottom] of the damper when looking in the direction of airflow.
- 3. The low leakage 18 gauge damper assembly shall incorporate a peripheral gasket on the damper blades for tight airflow shutoff.
 - a. Air leakage past the closed damper shall not exceed two percent of the unit maximum airflow at three inch water gauge inlet static pressure, tested in accordance with ASHRAE 130.
 - b. The damper, seal and bearing system shall be tested to 1.25 million cycles, or the equivalent of 100 full open/closures per day for 35 years, with no visible signs of wear, tear, or failure of the damper assembly after such testing.
- 4. Airflow Sensor:
 - a. The airflow sensor shall be a differential pressure airflow device measuring total and static pressures, mounted to the inlet valve.
 - b. Plastic parts shall be fire-resistant, complying with UL 94.
 - c. The airflow sensor shall be RoHS (Restriction of Hazardous Substances) compliant. Materials containing polybrominated compounds shall not be acceptable.
 - d. Control tubing shall be protected by grommets at the wall of the airflow sensor's housing.
 - e. The airflow sensor shall be furnished with twelve total pressure sensing ports, and include a center averaging chamber that amplifies the sensed airflow signal.
 - f. The airflow sensor signal accuracy shall be plus or minus five percent throughout terminal operating range.
- 5. Inlet Valve Features:
 - a. The inlet valve shall be a consistent diameter to retain flex duct and provide a stop for hard duct.
 - b. The inlet valve shall include a 1/8 inch raised single bead weld for added strength.
 - c. The gasket seal shall be a low leakage continuous piece with a peripheral gasket for tight airflow shutoff.
 - d. The inlet valve shall include two heavy duty stop pins to accurately position the damper in the closed position.

G. Controls:

- 1. See Section 23 09 13 - Instrumentation and Control Devices for HVAC: Thermostats and actuators for controls requirements.

H. Controls Sequence:

- 1. See Section 23 09 93 - Sequence of Operations for HVAC Controls for controls sequence requirements.

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PART 3 – EXECUTION

3.01 Examination

- A. Verify that conditions are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.

3.02 Installation

- A. Install the terminal units in accordance with the manufacturer's instructions.
- B. Install the inlets of the air terminal units with the airflow sensors a minimum of three duct diameters from elbows, transitions, and duct takeoffs.
- C. See drawings for the size(s) and duct location(s) of the air terminal units.
- D. Provide ceiling access doors or locate units above easily removable ceiling components.
- E. Support the terminal units individually from the structure.
- F. Embed anchors in concrete in accordance with ASTM E488/E488M.
- G. Do not support the terminal units from the ductwork.
- H. Connect the terminals to the ductwork in accordance with Section 23 31 00.
- I. Verify that electric power is available and of the correct characteristics.

3.03 Adjusting

- A. Ensure the damper operator attached to the assembly allows full modulation of flow range from 100 percent of design flow to zero.

3.04 Field Quality Control

- A. See Section 01 40 00 - Quality Requirements, for additional quality requirements.

3.05 Cleaning

- A. See Section 01 74 19 - Construction Waste Management and Disposal for additional cleaning requirements.

3.06 Closeout Activities

- A. See Section 01 78 00 - Closeout Submittals for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training for additional closeout requirements.