
SECTION 23 36 00
AIR TERMINAL UNITS**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Single-duct terminal units.
 - 1. Single-duct, constant-volume units.
 - 2. Single-duct, variable-volume units.

1.2 RELATED REQUIREMENTS

- A. Section 23 05 48 - Vibration and Seismic Controls for HVAC.
- B. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Thermostats and actuators.
- C. Section 23 09 23 - Direct-Digital Control System for HVAC.
- D. Section 23 09 93 - Sequence of Operations for HVAC Controls.
- E. Section 23 21 13 - Hydronic Piping: Connections to heating coils.
- F. Section 23 21 14 - Hydronic Specialties: Connections to heating coils.
- G. Section 23 31 00 - HVAC Ducts and Casings.
- H. Section 23 33 00 - Air Duct Accessories.
- I. Section 23 37 00 - Air Outlets and Inlets.
- J. Section 25 14 00 - Integrated Automation Local Control Units: HVAC controllers.
- K. Section 25 35 13 - Integrated Automation Actuators and Operators: Actuators.
- L. Section 25 35 16 - Integrated Automation Sensors and Transmitters: Thermostats.
- M. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils 2001, with Addenda (2011).
- B. AHRI 880 (I-P) - Performance Rating of Air Terminals 2017.
- C. ASHRAE Std 130 - Laboratory Methods of Testing Air Terminal Units 2016.
- D. ASTM A492 - Standard Specification for Stainless Steel Rope Wire 1995 (Reapproved 2019).
- E. ASTM A603 - Standard Specification for Metallic-Coated Steel Structural Wire Rope 2019.
- F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- K. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.
- L. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC

designation. Include electrical characteristics and connection requirements.

- C. Certificates: Certify that coils are tested and rated in accordance with AHRI 410.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.1 SINGLE-DUCT, VARIABLE-VOLUME AND CONSTANT-VOLUME UNITS

- A. Manufacturers:
 - 1. Krueger-HVAC; _____: www.krueger-hvac.com/#sle.
 - 2. Price Industries, Inc; _____: www.priceindustries.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Basis of Design: Price Industries, Inc: www.priceindustries.com/#sle.
 - 1. Single-Duct Terminal Unit: SDV, (direct digital controls).
- C. General:
 - 1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
 - 2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
- D. Unit Casing:
 - 1. Minimum 22 gauge, 0.0299 inch galvanized steel.
 - 2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
 - 3. Unit Discharge: Rectangular, with slip-and-drive connections.
 - 4. Acceptable Liners:
 - a. 1/2 inch thick, coated, fibrous-glass complying with ASTM C1071.
 - 1) Secure with adhesive.
 - 2) Coat edges exposed to airstream with NFPA 90A approved sealant.
 - 3) Cover liner with non-porous foil.
 - b. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.
- E. Damper Assembly:
 - 1. Heavy-gauge, galvanized steel or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
 - 2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
 - 3. Incorporate low leak damper blades for tight airflow shutoff.

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- F. Hot Water Heating Coil:
1. Coil Casing: Minimum 22 gauge, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.
 2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.
 3. Coil leak tested to minimum 350 psig.
 4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.
- G. Electric Heating Coil:
1. Listed and provided by the terminal unit manufacturer.
 2. Coil Casing: 20 gauge, 0.0359 inch galvanized steel.
 3. Heating Elements: Nickel chrome, supported by ceramic insulators.
 4. Integral Control Panel: NEMA 250, Type 2 enclosure with hinged access door for access to all controls and safety devices.
 5. Furnish a primary automatic reset thermal cutout and differential pressure airflow switch for proof of airflow.
 6. Provide the following additional components, mounted and/or wired within the control enclosure:
 - a. Fused or non-fused door interlocking disconnect switch.
 - b. Mercury contactors.
 - c. Fuse block.
 7. Factory wired, including all limit switches and steps of control as indicated on the equipment schedule, with the SSR (solid-state relay) proportional heat control.
 8. Provide SCR (Silicon Controlled Rectifier) controller.
- H. Electrical Requirements:
1. Single-point power connection.
 2. Equipment wiring to comply with requirements of NFPA 70.
- I. Controls:
1. Electronic:
 - a. Damper Actuator: 24 volt, power closed, spring return open.
 - b. Velocity Controller:
 - 1) Settings for minimum/maximum air volumes, factory-calibrated, and field adjustable at thermostat.
 - 2) Maintain constant airflow dictated by thermostat to within 5 percent of set point while compensating for inlet static-pressure variations up to 4 inch wg, when tested in accordance with ASHRAE Std 130.
 - 3) Provide controller with multi-point with velocity sensors located in air inlets and outlet.
 - c. Thermostat: Wall-mounted, time-proportional with reheat-coil control including a temperature set-point display in Celsius and Fahrenheit.
 - d. See Sections 25 1400, 25 3513, and 25 3516.
 2. DDC (Direct-Digital Controls):
 - a. Basis of Design: Price Industries, Inc; Price Intelligent Controller: www.priceindustries.com/#sle.
 - 1) The unit level controller to include the following:
 - (a) 24 VAC power terminal or RJ-12 Power connection.
 - (b) T-Stat Port for thermostat connection.
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- (c) Service Port for Price Linker diagnostic equipment.
 - (d) Damper actuator.
 - (e) Fan output connection.
 - (f) LED indication for troubleshooting.
 - (g) Three binary staged heating outputs.
 - (h) Binary cooling output.
 - (i) S.A.T. sensor input.
 - (j) Contact closure input.
 - (k) Four analog outputs.
 - b. Bi-directional Damper Actuator: 24 volt, powered closed, spring return open.
 - c. Microprocessor-Based Controller: Air volume controller, pressure-independent with electronic airflow transducers, factory-calibrated maximum and minimum CFM's.
 - 1) Occupied and unoccupied operating mode.
 - 2) Remote reset of temperature or CFM set points.
 - 3) Proportional, plus integral control of room temperature.
 - 4) Monitoring and adjusting with portable terminal.
 - d. Room Sensor:
 - 1) Compatible with temperature controls specified.
 - 2) Wall-mounted, system powered, with temperature set-point adjustment including connection access for portable operator terminal.
 - e. See Section 25 1400.
 - 3. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.
 - a. Basis of Design: Price Industries, Inc; SP300 Air Flow Sensor: www.priceindustries.com/#sle.
 - 1) Plastic parts are fire-resistant, complying with UL 94.
 - 2) Provides accuracy within 5 percent with a 90 degree sheet metal elbow directly at the inlet of the assembly.
 - 3) Control tubing is protected by grommets at the wall of the air flow sensor's housing.
 - 4) Furnished with twelve total pressure sensing ports and a center averaging chamber that amplifies the sensed air flow signal.
 - 5) Provide velocity pressure sensor with a removable access section for maintenance.
 - b. Signal accuracy: Plus/minus five percent throughout terminal operating range.
 - 4. Control Sequence:
 - a. Suitable for operation with duct pressures between 0.25 and 3.0 inch wg inlet static pressure.
 - b. Include factory-mounted and piped, 5-micron filter; and adjustable, velocity-resetting, high-limit control with amplifying relay.
 - c. See Section 23 09 93.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

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- A. Install in accordance with manufacturer's instructions.
 - B. Install the inlets of air terminal units and air flow sensors a minimum of four 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 units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.
 - F. Do not support from ductwork.
 - G. Connect to ductwork in accordance with Section 23 31 00.
 - H. Verify that electric power is available and of the correct characteristics.

3.3 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

END OF SECTION 23 36 00