



TRANE

Guide Spec Summary

Date: 05/21/2001
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Job Name: EarthWise VAV Terminal Units – Full Spec
Location: AnyTown, Earth
Prepared by:
Phone Number:
Prepared for:

Option List

SINGLE & DUAL DUCT UNIT LISTING	UL
FAN POWERED UNIT LISTING	UL
DUCT PRESSURE RATING	medium - 1.5-3.0 in. wg.
DUCT PRESSURE RATING	medium - 1.5-3.0 in. wg.
DUCT PRESSURE RATING	medium - 1.5-3.0 in. wg.

SECTION 15840

AIR TERMINAL UNITS - VARIABLE VOLUME

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single duct terminal units.
 - 1. Variable volume.
 - 2. Constant volume.
- B. Dual duct terminal units.
 - 1. Variable volume.
 - 2. Constant volume.
- C. Fan powered terminal units.
 - 1. Parallel flow (variable volume).
 - 2. Series flow (constant volume).
- D. Integral heating coils.
 - 1. Electric resistance.
 - 2. Hot water.
- E. Sound attenuator.
- F. Integral terminal unit controls.
 - 1. Direct digital.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15952 - Controls and Instrumentation:
Thermostats and control components.
- B. Section 16180 - Equipment Wiring Systems:
Thermostats and control components.

1.03 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. None.

1.04 RELATED SECTIONS

- A. Section 15510 - Hydronic Piping: Connections to heating coils.
- B. Section 15515 - Hydronic Specialties: Connections to heating coils.
- C. Section 15890 - Ductwork.
- D. Section 15910 - Ductwork Accessories.
- E. Section 15952 - Controls and Instrumentation.
- F. Section 15936 - Air Outlets and Inlets.
- G. Section 16180 - Equipment Wiring Systems: Electrical supply to units.

1.05 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- B. UL 181 - Factory-Made Air Ducts and Connectors.
- C. NFPA 70 - Electric Duct Heaters.
- D. UL 1995, Heating and Cooling Equipment.
- E. CUL C22.2 No. 236, Heating and Cooling Equipment.
- F. ARI 880 - Air-Conditioning and Refrigeration Institute Standard Rating Conditions for Air Terminals
- G. ASTM A 527 (Steel Sheet, Zinc Coated Galvanized).

1.06 SUBMITTALS

- A. Submit shop drawings and product data sheets indicating configuration, general assembly, and

materials used in fabrication.

- B. Submit installation, operation and maintenance documentation.

1.07 QUALIFICATIONS

- A. Manufacturer: The company manufacturing the products specified in this section shall have a minimum of ten years experience producing products of this type.

1.08 SYSTEM RESPONSIBILITY

- A. The contractor shall be responsible for any and all costs associated with any and all changes resulting from the use of a supplier other than the listed acceptable manufacturers.

1.09 WARRANTY

- A. Provide manufacturer's parts warranty for one year from unit start-up or eighteen months from unit shipment, whichever is shorter.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. General

1. Manufacturer shall participate in the ARI Certification program. Unit performance data shall be rated in accordance with ARI Standard 880. The manufacturer shall display the ARI Symbol on all units.
2. Single and dual duct terminal units shall be UL listed as an entire assembly.
3. Fan powered terminal units shall be UL listed as an entire assembly.

2.02 MANUFACTURED UNITS

- A. Single duct terminal units.

1. Ceiling mounted primary air control terminal units for connection to a single medium - 1.5-3.0 in. wg. pressure duct of a central air distribution system. Terminal units may be provided with controls and integral heating coils.
- B. Dual duct terminal units.
1. Ceiling mounted primary air control terminal units for connection to the medium - 1.5-3.0 in. wg. pressure ducts of two central air distribution systems. Terminal units may be provided with controls.
- C. Fan powered terminal units.
1. Ceiling mounted primary and recirculated air control terminal unit for connection to a single medium - 1.5-3.0 in. wg. pressure duct of a central air distribution system. Terminal units may be provided with controls and integral heating coils.
- D. Identify each terminal unit with clearly marked identification label and airflow indicator. Label shall include unit nominal air flow, maximum factory-set air flow, minimum factory-set air flow, and coil type.

2.03 FABRICATION

- A. Casings: Units shall be completely factory-assembled, manufactured of corrosion protected steel, and fabricated with a minimum of 18-gauge metal on the high pressure (inlet) side of the terminal unit damper and 22-gauge metal on the low pressure (outlet) side and unit casing.
- B. Assembly: Primary air control damper, airflow sensor, fans, controls and optional heating coil in single cabinet.
- C. Rectangular Supply Air Outlet Connections: Rectangular outlet connections for single duct units shall be slip and drive type. Rectangular outlet connections for dual duct and fan powered units

shall be flanged type.

2.04 PRIMARY AIR CONTROL DAMPER ASSEMBLY

- A. Locate primary air control damper assembly inside unit casing. Construct the damper assembly from extruded aluminum and/or a minimum 20 gauge galvanized steel components. Maximum damper leak rate shall not exceed 1% of damper nominal CFM at 4 inch wg. differential.
- B. Provide damper assembly with integral flow sensor. Flow sensor shall be provided regardless of control type. Flow sensor shall be a multi-point, averaging, ring or cross type. Bar or single point sensing type is not acceptable.

2.05 HEATING COILS

- A. Capacity: Provide coils in capacities as scheduled on the drawings.

2.06 FAN ASSEMBLY

- A. Fan assembly shall be forward curved centrifugal fan with direct drive permanently lubricated, permanent split-capacitor type, thermally protected motor. Motor must be capable of continuous operation under maximum fan load with no external static pressure. Provide unit with a SCR motor speed adjustment that is factory-installed and wired to the fan motor.
- B. Fan motor horsepower shall not exceed the horsepower scheduled for each unit. Fan motors shall be high efficiency and shall not exceed those shown in the table below for each motor size.

	115 Volt	277 Volt	347 Volt
FAN HP	AMPS	AMPS	AMPS
1/15	1.5	1.3	0.4
1/8	2.7	1.3	1.1
1/3	7.4	2.9	3.6
1/2	11.4	4.4	4.3

- C. Internally suspend and isolate fan motor assembly from unit casing by using rubber isolators or torsion flex mounting legs.

- D. Unit shall be equipped with a fan motor disconnect switch which breaks both legs of power entering the control box.

2.07 WIRING

- A. Factory install and wire power line fusing, a disconnect switch and a 24 VAC transformer for control voltage on fan powered direct digital or electronic control units. Provide terminal strip in control box for field wiring of thermostat and power source.
- B. Factory install and wire all terminal unit fan controls. Install electrical components in control box with removable cover. Incorporate single point electrical connection to power source.

2.08 TESTING / VERIFICATION

- A. Factory run-test all fan powered units.
- B. Factory set and check all analog electronic and pneumatic controllers to within 5% of scheduled maximum and minimum settings. Base performance on tests conducted in accordance with ARI 880.
- C. Maximum Casing Leakage: 1 percent of nominal air flow at 0.5 in wg inlet static pressure.
- D. Maximum Damper Leakage: 1 percent of design air flow at 4 in wg inlet static pressure.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02 ADJUSTING

- A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design air flow to 25 percent nominal air flow for cooling only units and 30 percent for units

with heating coils.

PART 4 SEQUENCE OF OPERATIONS

4.01 SEQUENCE OF OPERATION, SINGLE DUCT VAV TERMINAL UNITS WITH DDC CONTROLS

- A. Single Duct VAV Terminals, Cooling Only - On a rise in space temperature, the unit will modulate to provide maximum CFM. As space temperature decreases, the box will modulate down to its minimum CFM.
- B. Single Duct VAV Terminals With Reheat - On a rise in temperature above the cooling setpoint, the VAV terminal unit shall modulate to its maximum CFM. As the space temperature drops below the cooling setpoint, the terminal unit shall modulate to its minimum CFM. As the space temperature continues to fall to the heating setpoint, the terminal shall modulate to its heating minimum CFM. At this point, the heat will be staged on as follows:

4.02 SEQUENCE OF OPERATION, PARALLEL FAN POWERED TERMINAL UNITS WITH DDC CONTROLS

- A. Occupied Cycle
 - 1. Intermittent Fan Control - As the space temperature falls below cooling setpoint, the terminal unit shall modulate to its minimum cooling CFM. Upon a continued drop in temperature and/or unit CFM, the parallel fan will be energized. Upon a further decrease in space temperature, the terminal unit will modulate to heating minimum CFM. The heating will then be staged on as follows:
- B. Unoccupied Cycle
 - 1. The air valve shall drive closed. The fan and heat shall cycle to maintain a reduced space temperature.

4.03 SEQUENCE OF OPERATION - SERIES FAN POWERED TERMINAL UNITS WITH DDC CONTROLS

A. Occupied Cycle

1. Continuous Fan Control - The terminal unit fan shall operate continuously. Upon a rise in space temperature above cooling setpoint, the terminal unit shall modulate to provide maximum cooling CFM. A drop in space temperature will result in the unit modulating to provide its minimum cooling CFM. As the space temperature continues to fall, the unit shall modulate its cooling flow to its minimum heating CFM and energize the heat as follows:

- B. Unoccupied Cycle - During the unoccupied mode, the primary air valve shall modulate fully closed. The terminal fan and heat shall cycle as needed to maintain a reduced space temperature.

END OF SECTION