

GENERAL

Furnish and install Carnes Variable Air Volume Terminal Units of the size, capacity, and performance as shown on the plans.

PERFORMANCE

The air pressure drop through the terminal units shall not exceed values tabulated on the plans. Sound levels of the terminal units shall not exceed values shown. All performance data shall be **ARI certified** and rated in accordance with **Standard 880-2008**. An ARI label is to be attached to all certified units at time of shipping.

CONSTRUCTION

The valve assembly is to be constructed from galvanized steel with the damper mechanically fastened to a 3/8" shaft and isolated from the casing to eliminate the possibility of damper binding due to shipping or handling damage. The damper shaft is to rotate in oil impregnated sintered bronze bearings at three points for support and long life. The unit casing is to be constructed of 22 gauge galvanized steel.

The sound attenuator casing is to be constructed of 24 gauge galvanized steel.

CONTROL VALVE

The valve shall be sealed for minimum leakage. The throttling damper on Models AV, AD, AR and AB is to be of a sandwich design incorporating a solid sheet of Volara[®], type A gasket material sandwiched between two halves of reinforced galvanized steel. The average valve leakage of all unit sizes combined shall not exceed 1% at 3" inlet static pressure. Pneumatic control valves shall be supplied (Normally Open) (Normally Closed) as required.

INSULATION

The basic control units of Models AV, AD, AB and AR insulation shall be 1/2" thick. The internal insulation shall be a 4 lb./cu. ft. density outer layer laminated to an inner layer to yield a 2.0 lb./cu. ft. dual density fiberglass liner. The insulation for the Model AXAB sound attenuator shall be a 1" thick, 1.5 lb./cu. ft. dual density fiberglass material. The surface of the insulation for all units shall conform to **UL Tests 181** for erosion resistance. The insulation must be **UL** listed and meet **NFPA 90A** requirements for 250°F continuous temperature.

FOIL COATED INSULATION

The internal foil faced insulation shall be 1/2" thick (1" available), dual density fiberglass with a .001" aluminum foil on the matted face. The insulation must be **UL** listed conforming to the **UL Test 181** for erosion resistance and must meet **NFPA 90A** requirements for 250°F continuous temperature. The edges of the insulation must be sealed so that there is no exposed fiberglass material in the airstream.

STERIGARD INSULATION

Units with the Sterigard option shall be 1" thick. All casing insulation shall have a continuous 4 lbs./cu. ft. density (minimum) and shall be mounted internally. The external face of the insulation shall be reinforced nonporous foil. The insulation must be **UL** listed and meet **NFPA 90A** requirements for 250°F continuous temperature. All exposed insulation edges shall be sealed from the airstream using galvanized steel channels attached to the outer casing. There shall be no glass fiber exposed to the airstream.

CLEAN AIR TERMINAL INSULATION

Units with the Clean Air option shall be 1" thick. All casing insulation shall have a continuous 4 lb./cu. ft. density (minimum) and shall be mounted externally. There is to be no insulation in the airstream. The external face shall be reinforced foil. The insulation must be **UL** listed and meet **NFPA 90A** requirements for 250°F continuous temperature. **Also available are 1/2" closed cell foam and dual wall with solid or perforated inner liner.**

PNEUMATIC CONTROL

Pneumatic actuators shall be furnished and mounted by the terminal unit manufacturer and mounted by the terminal unit manufacturer. The actuators shall be pivoted to protect against side forces throughout the full stroke.

Provide **pressure independent pneumatic** volume control to maintain constant air volume regardless of duct pressure changes at air flows from minimum to maximum required by the zone. This action is to be instantaneous rather than having to wait for the thermostat to respond. External controls permit field adjustment of air volume. As a standard, the Carnes reset volume controller is offered for use with a reverse or direct acting thermostat and a normally open or normally closed damper. Compressed air consumption of the controls for single duct units shall not exceed 30 SCIM (0.017 SCFM) at 20 P. S. I. and for dual duct units shall not exceed 60 SCIM at 20 P. S. I.

Provide **pressure dependent pneumatic** volume control with field adjustable maximum and minimum stops. Control action shall be (Normally Open) (Normally Closed).

ELECTRIC CONTROL

Provide **pressure dependent electric** volume control with field adjustable maximum and minimum stops. Controls shall be direct drive to open and direct drive to close.

Individual 24 volt motors shall be provided for forward and reverse operation. The actuator assembly shall be direct drive mounted on the damper shaft. Valve action shall require approximately 6 minutes to travel between full open and full closed. The electric actuator assembly shall be used in conjunction with the rapid response thermostat with forward, null and reverse position.

ELECTRONIC CONTROL (Analog)

Provide **pressure independent analog electronic** control to maintain constant air volume regardless of duct static pressure changes at all air flows from minimum to maximum required by the zone thermostat. Thermostat with integral maximum and minimum air flow set points shall be provided by the terminal unit manufacturer. A line voltage to 24 volt transformer shall be provided.

DDC ELECTRONIC CONTROL (Digital)

The DDC control supplier must coordinate with the VAV manufacturer and will send the control devices to be VAV manufacturer to be factory mounted and wired. Calibration of DDC controls by control supplier.

CONTROLS ENCLOSURE

Provide a galvanized steel enclosure with a removable cover for protection of control components.

BALANCING

Terminal units shall have flow taps and calibration chart for the purpose of measuring air flow.

HOT WATER COIL

Hot water coil shall be slip and drive connected as an integral part of the terminal unit. If insulation is required, it must be field supplied and installed. Coils shall be constructed using 1/2" O.D. copper tubes, 1-1/4" x 1.08" (per row) rippled corrugated aluminum fins 0.005" thick. Fin spacing shall be 10 F. P. I. Coil connections shall be either right or left hand. All hot water coils to be pre-tested under water at 350 P.S.I.

ELECTRIC HEATERS

Each electric heater will have an integral air flow switch, automatic reset primary thermal cutout, resettable secondary thermal cutout, door interlocking disconnect switch, and 80/20 Ni-CH element wire. P/E switches shall be included with pneumatic controls. Disconnecting magnetic contactors and a 24 volt control transformer shall be included with electric and electronic controls. The electric heater will be available with 1, 2 or 3 stages.