



TRANE

Guide Spec Summary

Date: 05/21/2001
Time: 08:50:16 AM
Job Name: EarthWise Modular Climate Changer – Full Spec
Location: Any Town, Earth
Prepared by:
Phone Number:
Prepared for:

Option List

SUBMITTALS	Submittals
FILTERS - NUMBER	one set
FILTERS - TYPE	disposable
BID TYPE	Bid Type
AHU LAYOUT	AHU Single Path Layout
UNITS - TYPE	blow-thru single zone , stacked
UNITS - FEATURES	fan segments , coil segments , access segments , mixing boxes , filter segments , diffuser segments , discharge plenums
UNIT MOUNT	UNIT_MOUNT
UNIT CONSTRUCTION	UNIT CONSTRUCTION
CASING INSULATION - TYPE	Casing - Insulation
DOUBLE-WALL TYPE	solid
DWDI FANS	DWDI FANS
FAN SECTION - TYPE	supply
FAN - TYPE	FC
ISOLATORS - TYPE	2 inch spring
ACCESS DOORS - PLACEMENT	drive side
BELT GUARD	Belt Guard
FAN_VFD_BALANCE	FAN_VFD_BALANCE
FAN MOTOR - TYPE	open drip-proof
FAN MOTOR - VOLTS	460 Volts, 60 Hz, 3-phase
DRIVE - PITCH	variable
DRIVE - RATING	1.2
COIL CASINGS - MATERIAL	galvanized steel
CONDENSER TUBES - TYPE	Condenser Tubes - Type
COPPER - THICKNESS	.016
TUBES - TYPE	Tubes - Type
FINS - MATERIAL	aluminum
DRAIN PAN	Drain pan
INTERIOR PANS - MATERIAL	G90-U galvanized steel
FILTERS	Filters - Type
FILTER SECTION - TYPE	2 inch flat , 4 inch flat

FILTERS - TYPE	throwaway
FILTERS - PLACEMENT	one
DAMPERS	Dampers
DAMPERS - TYPE	Dampers - Type
DAMPERS - TYPE	outside air
BLADE ACTION - TYPE	parallel
DAMPER_TRAQ	DAMPER_TRAQ
ACCESS	ACCESS
ACCESS_CONST	ACCESS_CONST
ACCESS DOORS - PLACEMENT	one

SECTION 15720

MODULAR INDOOR AIR HANDLING UNITS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Packaged Air Handling Units.

1.02 RELATED WORK

- A. Section 01513 - Temporary Heating, Cooling, and Ventilating.
- B. Section 15121 - Expansion Compensation.
- C. Section 15290 - Duct Work Insulation.

1.03 REFERENCES

- A. ARI 430 - Standard for Central Station Air Handling Units.
- B. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- C. ANSI/AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- D. SMACNA - HVAC Duct Construction Standards.
- E. ARI 410 - Standard for Forced Circulation Air-Cooling and Air-Heating Coils.
- F. ANSI/UL 900 - Test Performance of Air Filter Units.
- G. AMCA 300 - Reverberant Method for Sound Testing of Fans.
- H. ARI 260 - Standard for Sound Rating of Ducted Air Moving and Conditioning Equipment
- I. AMCA 301 - Method for Publishing Sound Ratings for Air Moving Devices.
- J. ASHRAE 68 - Laboratory Method of Testing In-Duct

Sound Power Measurement Procedure for Fans.

1.04 QUALITY ASSURANCE

- A. Air Handling Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product offering.
- B. ISO 9001 Certification. The air handling manufacturer shall be registered to ISO 9001, establishing quality assurance requirements from design and development to production to installation and servicing.
- C. Constant Volume Air Handling Units: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
- D. Variable Air Volume Air Handling Units with Variable Inlet Vanes: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. Certify units with inlet vanes in wide-open position. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
- E. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410-87.

1.05 SUBMITTALS

- A. Submit unit performance including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and

accessories describing construction, components and options.

- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section [_____]. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow. Each section shall have lifting lugs or shipping skid to allow for field rigging and final placement of section.
- B. Deliver units to site with fan motors, sheaves, and belts completely assembled and mounted in units. Mount motors as specified in Article 2.04 Paragraph F and Article 2.05 Paragraph A.
- C. Store and protect products under provisions of Section [_____].
- D. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.08 EXTRA STOCK

- A. Provide one set of disposable filters.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Base bid shall be Trane with approved alternate being McQuay and York. Products as manufactured by McQuay and York, if they comply with this specification, may be acceptable. Alternate will be considered after the job is awarded.

2.02 GENERAL

- A. Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to engineer prior to bid date for approval. Mechanical Contractor is responsible for expenses that occur due to exceptions made.
- B. Unit layout shall be single path (single plenum), providing one path for outside air with all components arranged in series as specified below and indicated on drawings.
- C. Unit arrangement shall be [blow-thru single zone][stacked] type air handling units with [fan segments][coil segments][access segments][mixing boxes][filter segments][diffuser segments][discharge plenums].
- D. Factory fabricate air handling units of sizes, capacities, and configurations as scheduled on drawings.
- E. Provide unit mounting legs to support all sections of unit and raise unit for proper trapping. Contractor will be responsible for providing a housekeeping pad when unit mounting device is not of sufficient height to properly trap unit. Unit mounting devices not constructed of galvanized steel shall be chemically cleaned, coated with rust-inhibiting primer and finished with rust-inhibiting enamel.

2.03 CASING

- A. Unit shall be constructed of a complete structural frame with removable panels. Removal of side panels shall not affect the structural integrity of the unit. Contractor shall be responsible to provide connection flanges and all other framework that is needed on unit to ensure that removal of unit's panels shall not affect structural integrity. On units larger than 12 tons, manufacturer shall be able to ship each segment (filter, coil, fan) separate so that unit can be broken down for ease of installation in tight spaces.
- B. Panels shall be fully removable to allow complete access for inspection and cleaning of all interior surfaces. If panels are not removable, then manufacturer shall provide access sections with doors between all internal components to ensure access and cleanability of the air handler.
- C. Construct casing sections located upstream of supply fan for operation at 4 inches water gauge negative static pressure and casing sections located downstream of supply fan for operation at 6 inches water gauge positive static pressure.
- D. All exterior panels and structural frames shall be constructed of G90-U galvanized steel. Casings not constructed of G90-U galvanized steel, casings with welds on exterior surfaces, or casings with welds on interior surfaces that have burned through to exterior surfaces shall be chemically cleaned, coated with rust-inhibiting primer and finished with rust-inhibiting enamel in order to prevent premature corrosion and microbial growth.
- E. All joints between exterior panels and structural frames shall have seals and gaskets with closed-cell foam gasketing for air seal and acoustical break.
- F. Casing shall have full size removable access doors as scheduled on drawings. Access doors shall have double-wall construction. Provide automotive style neoprene gasketing around full perimeter of access doors to prevent air leakage. Provide "ventlock" style non-corrosive alloy latches operable from the

inside or outside of unit. If access doors open against unit operating pressure, provide safety latches that allow access doors to partially open after first handle movement and fully open after second handle movement.

- G. Insulate casing sections with 2" thick 1-1/2 pound per cubic foot density fiberglass insulation or equivalent. Provide double-wall casing construction and encase insulation between solid exterior and solid interior casing panels such that no insulation is exposed to airstream. Foil facing on insulation is not acceptable as alternate to double wall construction. Insulation shall comply with NFPA 90A.

2.04 FANS

- A. Provide supply fan section(s) with FC double-width, double-inlet centrifugal fan designed and suitable for class of service indicated in the unit schedule. Fan shaft to be properly sized and protectively coated with lubricating oil. Fan shafts shall be solid and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. Fans shall be statically and dynamically tested as an assembly at the required RPM to meet design specifications. Key fan wheels to fan shaft to prevent slipping.
 - 1. Provide self-aligning, grease lubricated pillow-block ball bearings selected for L-50 200,000 hour average life per ANSI/AFBMA 9. Extend both grease lubrication fittings to drive side of unit with plastic tubes and zerkl fittings rigidly attached to drive side bearing support.
- B. Mount fans on isolation bases. Internally mount motors on same isolation bases and internally isolate fans and motors with 2 inch spring isolators. Install flexible canvas ducts between fan and casings to ensure complete isolation. Flexible canvas ducts shall comply with NFPA 90A. If no isolators or flexible canvas duct is provided, then the entire unit shall be externally isolated from the supply duct work and piping by contractor in order to avoid transmission of noise and vibration through the ductwork.

- C. Fan sections shall have full height, double-wall, hinged, removable access doors on drive side for inspection and maintenance of internal components. Construct doors in accordance with Article 2.03 Paragraph E.
- D. Belts shall be enclosed as required by OSHA standard 29 CFR 1910 to protect worker from accidental contact with the belts and sheaves.
- E. Fan and motor assembly shall be weighed at AHU manufacturer's factory for isolator selection. Fan section assemblies shall be statically and dynamically balanced. Fan section assemblies include fan wheels, shafts, bearings, drives, belts, isolation bases and isolators. Isolators must be allowed to free float when performing fan balance. Vibration shall be measured at each fan shaft bearing in horizontal, vertical and axial directions. Design RPM's to be balanced as scheduled on drawings.
- F. Fan sections controlled by variable frequency drives, shall be balanced at all speeds from 25% and 100% of design RPM.

2.05 MOTORS AND DRIVES

- A. Factory install all motors on slide base to permit adjustment of belt tension.
- B. Fan Motors shall be heavy duty, open drip-proof, operable at 460 Volts, 60 Hz, 3-phase.
- C. V-Belt Drive shall be variable pitch rated at 1.2 times the motor nameplate.

2.06 COILS

- A. Coils shall be manufactured by the same company as the supplier of the air handling unit. Install coils such that headers and return bends are enclosed by unit casings.
- B. Construct coils of configuration plate fins and seamless tubes. Fins shall have collars drawn,

belled and firmly bonded to tubes by means of mechanical expansion of tubes. Do not use soldering or tinning in bonding process.

C. Construct coil casings of galvanized steel with formed end supports and top and bottom channels. If two or more coils are stacked in unit, install intermediate drain channels between coils to drain condensate to main drain pans without flooding lower coils or passing condensate through airstream.

D. Water Cooling Coils

1. Clearly label supply and return headers on outside of units such that direction of coil water-flow is counter to direction of unit air-flow.
2. Coils shall be proof tested to 300 psig and leak tested to 200 psig air pressure under water.
3. Construct headers of round copper pipe or cast iron.
4. Construct tubes of 1/2 inch O.D. minimum .016 inch thick copper and construct fins of aluminum.

E. Steam Heating Coils

1. Clearly label supply and return connections on outside of units.
2. Provide non-freeze steam distributing type coils. Pitch steam coils in units for proper drainage of steam condensate from coils.
3. Proof test coils to 300 psig air under water and leak test coils to 200 psig air pressure under water.
4. Construct headers of cast iron or round copper pipe.
5. Construct tubes of 5/8 inch O.D. copper inner tubes and 1 inch O.D. minimum .031 inch thick copper outer tubes. Construct fins of aluminum.

6. Inner tubes shall have orifices that ensure even steam distribution across coil face. Direct orifices toward return connections to ensure steam condensate is discharged from coils.

F. Refrigerant Cooling Coils

1. Clearly label suction and liquid connections on outside of units.
2. Proof test coils to 450 psig air under water and leak test coils to 300 psig air pressure under water. Dry insides of coils after testing and seal all connections.
3. Construct suction headers of copper tubing. Suction connections shall penetrate unit casings to allow for sweat connections to refrigerant lines.
4. Coils shall have equalizing type vertical distributors sized in conjunction with capacities of coils.

2.07 DRAIN PAN CONSTRUCTION

- A. Provide sealed double-wall drain pans constructed of G90-U galvanized steel exterior panels and G90-U galvanized steel interior liner. Encase insulation between exterior and interior walls. Drain pans shall be sloped in 2 planes; cross break interior pans and pitch toward drain connections to ensure complete condensate drainage. Units with cooling coils shall have drain pans under complete cooling coil section. Units with heating coils shall have a drain pan under complete heating coil segment to ensure proper drainage during cleaning. All drain pan connections will be to the side of the unit to enable proper trapping. Units without 2-way sloped drain pans shall coat drain pans with anti-microbial treatment.

2.08 FILTERS

- A. Provide factory-fabricated filter section of the same construction and finish as unit casings.

Filter sections shall have filter guides and full height, double-wall, hinged, removable access doors for filter removal. Construct doors in accordance with Article 2.03 Paragraph E. Provide filter blockoffs as required to prevent air bypass around filters.

- B. Provide [2 inch flat][4 inch flat] filter sections with throwaway filters. Filters shall be removable from one side(s) of filter sections.

2.09 DAMPERS

- A. Provide internally mounted ultra low leak outside air dampers as scheduled on drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent. Construct damper blades and damper frames of galvanized steel. Provide parallel blade action with metal compressible jamb seals and extruded vinyl blade edge seals. Blades shall rotate on stainless steel sleeve bearings. Damper blade lengths shall not exceed 60 inches. Leakage rate shall not exceed 5 CFM/square foot at one inch water gauge and 9 CFM/square foot at 4 inches water gauge. All leakage testing and pressure ratings will be based on AMCA Publication 500.
- B. Provide a factory-mounted ASHRAE Standard 62-89 airflow monitoring and control station in the outdoor air opening of the mixing box. The monitor shall track a variable outside air quantity for ventilation demand flow control and ventilation flow documentation. The airflow monitoring station shall be factory-mounted, factory-calibrated, and the installation certified by the airflow monitor manufacturer.
 - 1. The air handling unit mixing box shall also include a low lead modulating outside air damper mounted in series with the air flow monitor.
 - 2. The outside air damper blades shall be galvanized steel, housed in a galvanized steel frame with edge and seals and mechanically fastened to a normally closed, spring return, electric actuator through a solid steel shaft which shall rotate in permanently lubricated

bearings. All linkages, crank arms, jack shafts and mounting hardware shall be provided.

3. The airflow measurement station shall be calibrated to measure a variable airflow from 15% of nominal cfm up to 100% of design airflow, maintaining an accuracy of plus or minus five (5%) percent of actual cfm, for air measuring between -40F up to +158F.
4. Manufacturer shall submit test data to demonstrate compliance.
5. The airflow monitoring station shall provide a proportional output velocity signal (2-10 vdc). The velocity sensor shall have an automatic zeroing function and it shall be programmed to recalibrate the device's transducer a minimum of once per day. Power requirements shall not exceed 100VA per monitor at 24 VAC with power being provided by the Building Automation System (BAS) contractor. The monitor manufacturer shall provide to the Building Automation System (BAS) contractor a certified conversion table for the signal provided.

2.10 ACCESS SECTIONS

- A. Access for inspection and cleaning of the unit drain pan, coils and fans sections shall be provided. The unit shall be installed for proper access. Procedure for proper access, inspection and cleaning of the unit shall be included in the maintenance manual. Access section shall have double wall, hinged, removable access doors on one sides of sections. [Construct doors per Article 2.03 Paragraph E.]

2.11 AIR HANDLING UNIT SCHEDULE

Drawing Code	Unit AS-1	Unit AS-2	Unit AS-3
Manufacturer			
Model			
Type			
Arrangement			
Coil Velocity			
Filter Velocit			

Fan
Capacity CFM
ESP inch Wg
TSP inch Wg
Motor hp
Max Fan bhp
Heating Coil
-Fin Series
-Type
-Height inch
-Width inch
-Rows
-Capacity Btu/
-Air Entering
-Air Leaving d
-Air SP Drop i
-Water Enterin
-Water Leaving
-Water Pressur
-Steam Capacit
-Steam Pressur
Cooling Coil
-Fin Series
-Type
-Height inch
-Width inch
-Rows
-Capacity Btu/
-Air Entering
-Dry Bulb deg
-Wet Bulb deg
-Air Leaving
-Dry Bulb deg
-Wet Bulb deg
-Water, gal/mi
-Water Enterin
-Water Leaving
-Water Pressur
-Saturated Suc
-Condensing Te

PART 3 EXECUTION

PART 4 SEQUENCE OF OPERATIONS

END OF SECTION