

SECTION 1558X – AIR HANDLING UNITS

PART TWO: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide custom (*indoor / outdoor*) air handling units as manufactured by Temtrol as the basis-of-design. Equipment manufactured by Webco, Governair, Ventrol York/Miller-Picking “CustomMaster” or Buffalo “Big Buffalo” shall be considered provided the construction specifications (thermal break design, air leakage rate), capacities and performance criteria are met.

2.02 GENERAL

- A. Furnish and install where shown on the plans, welded frame air handling units (*optional: specifically designed for OUTDOOR application*) with construction features as specified below. The units shall be provided and installed in strict accordance with the specifications. All units shall be complete with all components and accessories as specified. Any exceptions must be clearly defined. The contractor shall be responsible for any additional expenses that may occur due to any exception made.
- B. **Optional:** Unit shall be designed to comply with the “High Velocity Hurricane Zone of the Southern Building Code” and approved by the “Miami-Dade County Product Control Division”. Unit design criteria shall include the following minimum standards: DCBCCD PA 201-94 Large and Small missile impact, PA 202-94 Air & Water infiltration, PA 202-94 Static Air Pressure Test (Design Load +/- 100psf), PA 203-94 Fatigue Loading Test (Design Load +/- 100psf).

*Note: It shall be the responsibility of the contractor to provide a “Miami-Dade County Product Control Division” approved screened enclosure around all units that do not meet the minimum standards as outlined in 2.02. B. Units requiring field modifications to achieve Miami Dade NOA are unacceptable.*

- C. **Optional:** If unit manufacturer cannot provide “sole source” for major components: (**fans, coils, dampers**) they must list supplier and quote lead time for replacement parts on bid. If units are built outside the USA list country of origin on bid.

2.03 Factory Testing (Optional)

- A. Factory Leak Testing: The unit manufacturer shall provide a witnessed factory leak test on units at design total static pressure (*OPTIONAL: 8”, 10”, 12” of differential static pressure*) across the cabinet exterior walls. Cabinet leakage is not to exceed (*1% or 1.5%*) of specified airflow on the operating side of the unit. All panels shall be sealed with closed cell gasketing material. Manufacturer shall notify contractor and/or owner 14 days prior to test for witnessing. (Travel expenses are not part of this contract). Owner’s representative shall select one unit to be tested at the time of release to be tested. A written test report shall be prepared by the manufacturer and issued to the Owner’s representative.

- B. Factory Panel Deflection Testing: The unit manufacturer shall provide a factory deflection test on one unit at design total static pressure (*OPTIONAL: 8", 10", 12" of differential static pressure*) Deflection: The cabinet shall be pressurized to the "test" static pressure Deflection limit of L/200 will be demonstrated at this time. "L" is defined as the height of the unit on the sides, width of the unit on top panels and the smaller of the width or height for the ends. Measurements shall be at mid point of "L" along the vertical seam of the largest panel on the side.

**Height of panel = H x (.005) = inches deflection allowed**

Manufacturer shall notify contractor and/or owner 14 days prior to test for witnessing. (Travel expenses are not part of this contract). Owner's representative shall select one unit to be tested at the time of release. A written test report shall be prepared by the manufacturer and issued to the Owner's representative.

- C. Factory Sound Testing: (**OPTIONAL FOR SOUND-SENSITIVE APPLICATIONS**). The unit manufacturer shall test one unit at an AMCA accredited Laboratory. The unit shall be tested per AMCA 300 Unit Discharge Sound Power Test, AMCA 300 Unit Return Sound Power Test, and AMCA 300 Running Unit Cabinet Radiated Sound Power Test. Manufacturer shall notify contractor and/or owner 14 days prior to test for witnessing. (Travel expenses are not part of this contract). Owner's representative shall select one unit to be tested at the time of release. A written report shall be provided showing the test results and the test methods used.

## 2.04 UNIT DESCRIPTION

- A. Provide factory-fabricated air handling units with capacity as indicated on the schedule. Units shall have overall dimensions as indicated and fit into the space available with adequate clearance for service as determined by the Engineer. All units shall come completely assembled. Multiple sectioned units shall be shipped as a single factory assembled piece (except where shipping limitations prevent) de-mounted into modular sections in the field by the contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by the contractor. Unit manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and ARI 410. All electrical components and assemblies shall comply with NEMA standards. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." Units shall comply with NFPA 70, "National Electrical Code," as applicable for installation and electrical connections of ancillary electrical components of air handling units. Units shall be UL or ETL listed.
- B. Unit Base / Frame / Floor
1. Provide a full perimeter welded base frame manufactured with structural steel tubing and C-Channel cross support members on close centers. Unit frame shall be from 14-gauge carbon tubular steel, mig welded to form a unitized

assembly for support of all internal components. Base and unit frame shall be painted with a lacquer resisting gray phenolic corrosion inhibitive primer. Base rails shall be fitted with lifting lugs at the corner of the unit or section (if de-mounted). The base shall include a 4-inch thick insulated "double bottom" floor with minimum 20 gauge G-90 galvanized outer and 16 gauge G-90 galvanized inner walk-on surface. *Optional: (16 gauge G-90 galvanized steel outer and a 14 gauge G-90 galvanized steel inner). (20 gauge 304 stainless steel outer and 16 gauge 304 S.S. inner). (20 gauge G-90 galvanized outer and 10 or 12 gauge aluminum tread-plate inner surface.)* All floor seams shall be gasketed, caulked and sealed for an airtight / thermal break floor. Where access is provided to the unit interior, floor openings shall be covered with walk on steel safety grating. Single wall floors with glued and pinned insulation are not acceptable. Base frame shall be attached to the unit at the factory.

### C. Exterior Panels

1. The exterior panel shall be fabricated from formed 16 gauge G-90 galvanized steel with exterior coating as specified below. *Optional: (14 gauge G-90 galvanized steel). (14 gauge (.063) aluminum with no exterior paint). (16 gauge 304 stainless steel with no exterior paint).* Flat panel design is not acceptable. The air handling unit casing shall be of the "no-through-metal" design. The casing structure shall incorporate insulating thermal breaks as required so that, when fully assembled, there exists no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide necessary support to limit casing deflection to 1/200 of the narrowest panel dimension. If panels cannot meet this deflection, add additional internal reinforcing. Panels shall be gasketed and secured to the tubular steel frame with 1/4" hex head, zinc plated fasteners and neoprene washers. Outer panels must be removable without affecting the structural integrity of the unit. All panel seams shall be caulked and sealed for an airtight unit. Leakage rates shall be less than 1% at design static pressure or 8" whichever is greater. The exterior panel finish shall be non paint: Bright spangled galvanized *Optional:* a polyester resin paint system that is designed for long term corrosion resistance meeting or exceeding (ASTM B-117) Salt Spray Resistance at 95 degrees F. 1,000 hrs. and (ASTM D-2247) Humidity Resistance at 95 degrees F. 1,000 hrs. The color shall be sterling gray.

Note: If manufacturer cannot provide thermal break (no through metal) and or removable exterior panel construction it must be noted as an exception on the bid.

### D. Double Wall Construction

1. Each unit shall have double wall construction with (16 / 20 ) gauge solid (galvanized / stainless steel / aluminum) liner in the \_\_\_\_ (section / entire unit). (18 / 20 / 22) gauge perforated (galvanized / aluminum) liner in the \_\_\_\_ (section / entire unit). The entire double wall panel shall be removable from the outside if the unit without affecting the structural integrity of the unit.

2. *Optional: (perforated sections shall be furnished with): (BGF 7628/252L fiberglass cloth used to prohibit the erosion of the insulation into the air stream) (Kinetics KNM loaded vinyl limp mass barrier shall be used in all sections with perforated liner. Vinyl barrier shall be sandwiched between two layers of insulation.*

E. Insulation

1. Entire unit / \_\_\_\_ section to be insulated with a full (1, 2, 3, 4)" thick non-compressed fiberglass insulation. The insulation shall have an effective thermal conductivity (C) of .24 (BTU in./sq.ft.Fdegrees) and a noise reduction coefficient (NRC) of 0.70 / per inch thick (based on a type "A" mounting). The coefficients shall meet or exceed a 3.0 P.C.F. density material rating. Insulation shall meet the erosion requirements of UL 181 facing the air stream and fire hazard classification of 25/50 (per ASTM-84 and UL 723 and CAN/ULC S102-M88). All insulation edges shall be encapsulated within the panel. All perforated sections or single wall units shall have Tuf-Skin insulation with black acrylic coating. *Optional: Tuf-Skin Rx with black acrylic coating) (Spin-Glas with FSK foil/skrim/kraft) as manufactured by Johns Manville or approved equal.*

F. Access Doors

1. The unit shall be equipped with a solid double wall insulated, hinged access doors as shown on the plans. The doorframe shall be extruded aluminum with a built in thermal break barrier and full perimeter gasket. The door hinge assembly shall be die cast zinc with stainless steel pivot mechanism, completely adjustable. There shall be a minimum of two heavy duty cast; UV rated; nylon handles per door. Provide ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors.

Note: If manufacturer cannot provide thermal break door design it must be noted as an exception on the bid.

*(Optional: Access doors (in the fan section) (all sections) shall be provided with a 10 x 10 dual thermal pane safety glass window.*

G. Fans

1. Forward Curved (FC) DWDI fans: Fan housing shall be heavy gauge galvanized steel construction. Fan scroll shall be bolted to assembly frame. Fan bearings shall be heavy duty, pillow block, self-aligning ball type. Bearings shall be selected for a minimum L-50 life (200,000) hours at the maximum horsepower and operating speed for the classification. Fan shaft shall be turned, ground and polished solid steel rated at maximum RPM below critical speed. Fan wheel and sheaves shall be keyed to the shaft. Fan shall be IRD balanced (per ANSI / AMCA 204-96 fan application category BV-3) at design RPM with belts and drives in place to a vibration velocity less than or equal to .157 inches per second measured horizontal and vertical at each

bearing pad. Vibration amplitudes are in inches/second-Peak. All values are filter-in at the fan speed.

2. Airfoil Fan (AF) DWDI Class II housed fans: Fan shall be double width double inlet as indicated on the schedule. Fan blades shall be hollow airfoil in shape, welded to the center and wheel side plates. Fan bearings shall be heavy duty, self-aligning, Dodge concentric "Grip Tight" type with full contact on shaft. Bearings shall be selected for a minimum L-50 life (200,000) hours at maximum horsepower and operating speed for the classification. Rigid supports for both bearings must be removable for access to the wheel. Fan housing shall be heavy gauge, continuously welded, steel construction. Inlet cones shall be precision spun and aerodynamically matched. Fan shaft shall be turned, ground and polished solid steel rated at maximum RPM below critical speed. Fan wheel and sheaves shall be keyed to the shaft. Fan shall be IRD balanced (per ANSI / AMCA 204-96 fan application category BV-3) at design RPM with belts and drives in place to a vibration velocity less than or equal to .157 inches per second measured horizontal and vertical at each bearing pad. Vibration amplitudes are in inches/second-Peak. All values are filter-in at the fan speed. Fan shall be rated in accordance with AMCA 210 for performance and AMCA 300 for sound.
3. Plug Fan (PF) SWSI fans: Fan shall be single width single inlet arrangement 3 plenum fan as indicated on the schedule. Fan blades shall be hollow airfoil in shape, welded to the center and wheel side plates. Fan bearings shall be heavy duty, self-aligning, Dodge concentric "Grip Tight" type with full contact on shaft. Bearings shall be selected for a minimum L-50 life (200,000) hours at maximum horsepower and operating speed for the classification. Rigid support for the inlet bearing must be removable for access to the wheel. Inlet cone shall be precision spun. Fan shaft shall be turned, ground and polished solid steel rated at maximum RPM below critical speed. Fan wheel and sheaves shall be keyed to the shaft. Fan shall be IRD balanced (per ANSI / AMCA 204-96 fan application category BV-3) at design RPM with belts and drives in place to a vibration velocity less than or equal to .157 inches per second measured horizontal and vertical at each bearing pad. Vibration amplitudes are in inches/second-Peak. All values are filter-in at the fan speed. Fan shall be rated in accordance with AMCA 210 for performance and AMCA 300 for sound.
4. The following fan options shall be provided:
  - a) Pressure relief fittings furnished on all bearings.
  - b) Stainless steel shaft with center punch for tachometer.
  - c) Internally spring isolated fan, motor and drive on a structural steel base complete with flex connection. Formed metal isolation bases will not be

acceptable. Provide Amber Booth (Zone 4) seismically restrained isolator type (SWSR or SWERT) with (1, 2, or 3 inch) deflection.

- d) Fully welded fan inertia base. The base shall be constructed from structural steel and a minimum 14 gauge bottom pan. Formed members are not acceptable. Provide ½" re-bar welded in place on 12" centers in both directions. Concrete fill (4" deep) is furnished by contractor. The unit must be in a permanent location before pouring concrete.
  - e) Provide airflow monitoring device equal to TemFLO device at the inlet of all supply fans. Air monitoring device shall consist of an array of differential pressure flow sensors mounted at opposing 90° positions around the inlet of the plenum fan. Flow sensors shall be manifolded together with pneumatic tubing to form a piezometric ring. Each fan assembly and air monitoring device shall have been tested for airflow vs. differential pressure and calibrated in an AMCA Accredited Laboratory throughout the fans range of operation. 4-20ma low pressure transducer with accuracy of ±1% full span and temperature compensated from 25 to 150°F, shall be mounted on fan inlet plate or fan bulk head wall to provide feedback. Air monitoring device shall not obstruct the fan inlet, be directly mounted across the fan inlet or have any effect on fan air performance or sound power levels.
- H. Motors shall be NEMA Design B; T-FRAME mounted on an adjustable steel base. All motors shall be tested to IEEE standard 112 test method B and rated per NEMA MG1, Part 31 "Inverter Fed Motors". All motors shall be specifically designed to meet or exceed all (EPA) requirements for energy efficiency and include Class 'F' insulation. Motors shall be as manufactured by WEG, Reliance or equal. Motors shall meet the electrical characteristics as specified for voltage, rpm, and efficiencies in Section \_\_\_\_\_.
- I. Variable Pitch drives sheaves shall be furnished on motors up to 10 HP and fixed pitch on 15 HP and above. Fixed pitch sheaves shall be provided on all fans in excess of 2,000 rpm. V-Belt drives shall be selected at 175% motor nameplate horsepower. *Option: Unit manufacturer to provide a sheave change after final field balance.*
- J. Water Coils
- 1. All coil assemblies shall be leak tested under water at 315 PSIG and PERFORMANCE is to be CERTIFIED under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be noted.
  - 2. Cooling coils shall be mounted on stainless steel support rack to permit coils to slide out individually from the unit. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout. Water coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins are die formed Plate type.

3. Headers are to be seamless copper with die formed tube holes.
4. Connections shall be male pipe thread (MPT) Schedule 40 Red Brass with 1/8" vent and drain provided for complete coil drainage. All coil connections shall be extended to the exterior of the unit casing by the manufacturer. Coils shall be suitable for 250 PSIG working pressure. Intermediate tube supports shall be supplied on coils over 44" fin length with an additional support every 42" multiple thereafter.
5. Water coils shall have the following construction:

Standard 1/2":

- 1/2" o.d. x .017" wall copper tube with .025 return bends
- .006" aluminum fins
- 16 gauge galvanized G-90 steel casing

Standard 5/8":

- 5/8" o.d. x .020" wall copper tube with .028 return bends.
- .008" aluminum fins
- 16 gauge galvanized G-90 steel casing

*Options:*

- 1/2" o.d. x .025" wall copper tube with .025 return bends.
- 5/8" o.d. x .025" wall copper tube with .035 return bends
- 5/8" o.d. x .035" wall copper tube with .049 return bends
- 5/8" o.d. x .049" wall copper tube with .049 return bends
- .035" return bends (available on 5/8" coil only)
- .010" aluminum fins
- .006" / .008" copper fins (1/2" option is .006" copper fins only.)
- 16 gauge 304 stainless steel casing (*recommended on cooling coils*). *Standard on all copper fin coils*

K. Direct expansion coils

1. Direct expansion coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins shall be die formed plate type. Headers are seamless copper with die formed tube holes. Connections shall be O.D. sweat copper and includes a refrigerant distributor. Hot gas bypass, when supplied, is piped in the field by others to avoid damage during handling and installation. Intermediate tube supports shall be supplied on coils over 44" fin length, with an additional support every 42" multiple thereafter.
2. Direct expansion coils shall have the following construction:

Standard 1/2":

- 1/2" o.d. x .017" wall copper tube with .025 return bends
- .006" aluminum fins
- 16 gauge galvanized G-90 steel casing

Standard 5/8":

- 5/8" o.d. x .020" wall copper tube with .028 return bends
- .008" aluminum fins
- 16 gauge galvanized G-90 steel casing

*Options:*

- Thermal Expansion Valve (remote bulb mounted by others)
- Hot Gas Bypass shall be provided.

- 1/2" o.d. x .025" wall copper tube with .025 return bends.
- 5/8" o.d. x .025" wall copper tube with .035 return bends
- 5/8" o.d. x .035" wall copper tube with .049 return bends
- 5/8" o.d. x .049" wall copper tube with .049 return bends
- .035" return bends (available on 5/8" coil only)
- .010" aluminum fins
- .006" / .008" copper fins (1/2" option is .006" copper fins only.)
- 16 gauge 304 stainless steel casing (*recommended on cooling coils*). *Standard on all copper fin coils*

L. Standard steam coils

1. Standard steam coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. Fins shall be die formed plate type. Headers shall be seamless copper with die formed tube holes. Connections shall be male pipe thread (MPT) Schedule 40 Red Brass. Steam pressure above 50 PSIG will have opposite end connections. Maximum fin length of 120" with same end connections. Intermediate tube supports shall be supplied on coils over 44" fin length, with an additional support every 42" multiple thereafter. Standard construction shall be suitable for 25 PSIG steam pressure.
2. Standard steam coils shall have the following construction:

Standard:

- 5/8" o.d. x .025" wall tube. (25 psig maximum steam pressure)
- .008" aluminum fins.
- 16 gauge galvanized G-90 steel casing

*Options:*

- 5/8" o.d. x .035" wall tube. (50 psig maximum steam pressure)
- 5/8" o.d. x .049" wall tube. (100 psig maximum steam pressure)
- .010" aluminum fins
- .006" / .008" copper fins
- 16 gauge 304 stainless steel casing

M. NF (non-freeze) steam coils

1. NF (non-freeze) steam coils shall be constructed of 1 1/8" o.d. seamless copper tubing mechanically expanded into fin collars. The 5/8" o.d. inner steam distributing tubes shall be centered in the outer condensing tube (1 1/8" o.d.). The inner tube shall have proportionally spaced directional steam jet orifices. These orifices direct the condensate flow to the outlet. Fins shall be die formed plate type. Headers shall be seamless copper with die formed tube holes. Connections shall be male pipe thread (MPT) copper. Intermediate tube supports shall be supplied on coils over 44" fin length with an additional support every 42" multiple thereafter. Coils exceeding 144" fin length shall have two coils with connections right and left. Coils are to be pitched in the casing for drainage. Standard construction shall be suitable for 50 PSIG steam pressure.

***NOTE: If EAT is 32°F or less, a minimum of 5 psig is recommended. Modulating valves should not be used on any coil subject to freezing.***

Standard:

- ( ) 1 1/8" x .035" wall tube. (50 psig maximum steam pressure)
- ( ) .010" aluminum fins.
- ( ) 16 gauge galvanized G-90 steel casing

***Options:***

- ( ) 1 1/8" x .049" wall tube. ( 100 psig maximum steam pressure)
- ( ) .006" / .008" copper fins
- ( ) 16 gauge 304 stainless steel casing

N. Condensate Pan:

1. IAQ style drain pans shall be provided under all cooling coils as shown on the drawings. The drain pan shall be fabricated from 16 gauge 304 stainless steel. ***Optional:*** 16 gauge 316 stainless steel. All pans are to be triple pitched for complete drainage with no standing water in the unit. They shall be insulated minimum 3-inch "Double Bottom" construction with welded corners. Provide stainless steel, 1-1/4" MPT drain connection extended to the exterior of the unit base rail. Units in excess of 159 inches shall have drain connections on both sides. All drain connections shall be piped and trapped separately for proper drainage.

O. Filters

1. Provide filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the unit. Face loaded pre and final filters shall have Type 8 frames as manufactured by AAF, FARR or equal. Side service filter sections shall include hinged access doors on both sides of the unit. Internal blank-offs shall be provided by the air unit manufacturer as required to prevent air bypass around the filters. The filters

shall be as manufactured by Farr, Purolator, AAF or equal. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters.

2. Filter Gage: Each Filter bank shall be furnished with: (Magnehelic filter gage (Dwyer Series 2000) Air filter gage (Dwyer Mark 25 ) Inclined manometer (DWYER 250 AF )

P. Dampers

1. Provide low leak dampers as indicated on the unit drawings. Low leakage dampers shall have airfoil blades. Flat or formed metal blades are not acceptable. The damper blade shall incorporate santoprene rubber edge seals and zinc plated tubular steel shaft for a non-slip operation. Shaft bearings holes shall be N.C. machine punched and fitted with one inch O.D. heavy duty nylon bearings to eliminate friction and any metal to metal contact. Damper jamb seals shall be stainless steel spring arcs designed for a minimum air leakage and smooth operation. Damper linkage shall be concealed within a 16 gauge G-90 galvanized steel frame. (Operator furnished and installed by section \_\_\_\_\_).
2. Multizone dampers: Cold and Hot deck shall be on a common shaft driven by one operator. (Operator furnished and installed by section \_\_\_\_\_).
3. Provide smoke dampers as indicated on the unit drawings. All smoke dampers shall be Ruskin Mfg. Co. Model SD-( 35 / 60 ) furnished and mounted by unit manufacturer. For UL listing, (electric / pneumatic) operators must be furnished with the Ruskin damper. Actuator type shall be:
  - ( a ) Electric 120 VAC 2 position
  - ( b ) Electric 24 VAC 2 position
  - ( c ) Electric 24 VAC modulating
  - ( d ) Pneumatic 2 position
  - ( e ) Pneumatic modulating

Q. AIR MONITORING STATION:

1. The air monitoring station shall combines the functions of control damper and flow measurement station in one assembly. Air straightener is 3000 series aluminum alloy honeycomb contained in 5" long 16 gage galvanized sleeve attached to monitoring blade frame.. Fixed anodized aluminum monitoring blades are mounted in 10" 16 gage galvanized frame. Control dampers feature airfoil shaped 6063T5 heavy gage extruded aluminum blades rotating on 1/2" plated steel hex axles, mounted in a 4"x 1" 6063T5, .081" thickness extruded aluminum channel with mounting flanges on both sides of frame. Jamb seals are flexible metal compression type. Blade seals are Ruskiprene seals along control damper blade edges. Bearings are molded synthetic. Linkage is galvanized steel, concealed in frame.

The acceptable range of operation is 300- fpm to 2000- fpm face velocity.

The air monitoring station shall be tested to AMCA Standard 611-95 and qualified to bear the AMCA Ratings Seal for Airflow Measurement performance. Ruskin AMS50 is the basis of design.

**OPTIONS:**

Damper and monitor furnished and installed by AHU manufacturer.  
All wiring / tubing shall be done in the field by OTHERS.

Electric 120 VAC 2 position actuator  
Electric 24 VAC 2 position actuator  
Electric 24 VAC modulating (mixing) actuator  
Pneumatic 2 position actuator  
Pneumatic modulating (mixing) actuator

Controller with factory calibration  
Stainless steel linkage on damper portion

2. The damper/air monitoring station shall include an air straightener vane and a 24 VAC actuator. The acceptable range of operation is 300 fpm to 2000 fpm face velocity. All min/max dampers incorporate a low leakage damper unless otherwise indicated. Ruskin IAQ50 is the basis of design

**OPTIONS:**

Damper and monitor furnished and installed by AHU manufacturer.  
All wiring / tubing shall be done in the field by OTHERS.

R. Sound Attenuators

1. Sound attenuator as manufactured by (TSI, TranSonic Industries) or (Vibro Acoustics): shall be provided as indicated on the schedule.

S. Louvers:

*Temtrol style suitable for all exhaust air applications:*

Provide extruded aluminum stationary louvers, drainable type with built in downspouts and birdscreen. Blades shall be housed inside a 16 ga. galvanized steel frame mounted to the unit exterior. Louver and unit colors are equal.

*Ruskin louver is recommended for all O/A applications:*

RUSKIN EME6625D extruded aluminum louvers shall be used at O/A location. Louvers shall be stationary, drainable type with built in downspouts and furnished with birdscreen. Blades shall be vertical and housed inside a aluminum frame mounted to the unit exterior. Louvers shall be painted to match the unit exterior.

T. Rain Hood:

Rain hoods shall be fabricated from same material as unit casing with 1/4" wire mesh inlet screen. Hoods sized to minimize moisture carry over.

U. Pipe Chase:

Outdoor units shall be furnished with an internal *Optional*: 12, 18, 24 inch pipe chase. Insulated pipe chase shall include adequately sized access door(s) for installation and maintenance to all piping. *Optional*: Internal pipe chase is furnished with an additional 12, 18 or 24 -inch external pipe chase. *Optional*: Outdoor units shall be furnished with an external *Optional*: 18, 24 inch pipe chase. Insulated pipe chase shall include adequately sized access door(s) for installation and maintenance to all piping).

V. Electrical

1. All electrical and automatic control devices not previously called out or listed below are to be furnished and installed in the field by OTHERS.

- ( ) Provide a motor starter panel with main disconnect for each unit
- ( ) The fan motor shall be wired to a junction box mounted on unit exterior.
- ( ) Each fan motor shall be wired to a non-fusible disconnect.
- ( ) The unit shall be equipped with a vapor proof light fixture(s) (with guard).
- ( ) Lights shall be controlled by one light switch mounted adjacent to the supply air fan access door.
- ( ) Each light shall have its own light switch mounted adjacent to the access door.
- ( ) Furnish a 120 volt duplex convenience outlet on the exterior of the unit. Locate the outlet next to the fan section access door.
- ( ) A separate VFD is required for each motor in the unit including factory mounting and wired to motor.
- ( ) Recessed compartment shall be furnished on the (*end / side*) of the unit. Compartment shall be ventilated with supply air from the unit to provide adequate cooling of electrical components mounted within. Access door(s) shall be furnished on the unit exterior to provide service to all components.