

AIR HANDLING UNITS

PRODUCTS

1.01 ACCEPTABLE MANUFACTURERS

- A. Provide custom outdoor air handling units as manufactured by Flanders/AirSeal as the basis-of-design.

1.02 GENERAL

- A. Furnish and install where shown on the plans, air handling units 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.

1.03 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. Units with split will ship each individual section separately. Each section shall be furnished with sufficient gasket and bolts for reassembly in the field by the contractor. All electrical components and assemblies shall comply with NEMA standards. Unit manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and ARI 410. 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."

B. Unit Base

1. Provide a full perimeter welded base frame manufactured with structural C channel or HSS tubing. All cross support members shall be structural C channel or HSS tubing. Unit base shall be mig welded to form a unitized assembly for support of all internal components. Base shall be painted with an air dried gray corrosion inhibitive primer and top coat. Base frames shall be fitted with lifting lugs. Lifting lug locations shall insure of maximum deflection of each section during rigging not to exceed ¼". The coil section only shall include a 4-inch thick insulated "double bottom" floor with minimum 20 gauge G-90 galvanized outer and 3/16 Aluminum 3003H-14 tread plate inner walk-on surface. All interior walk able surfaces must be thermally isolated from the perimeter base frame to provide the true no-thru metal Thermal Break. Where access is provided to the unit interior, floor openings shall be covered with walk-on steel safety grating. Base frame shall be attached to the unit at the factory. Perimeter of the floor including perimeter of each floor opening shall be equipped with the 2" standing lips to insure any occasional moisture entrapment.

### C. Exterior

1. The exterior panel shall be fabricated from formed 16 gauge A-60 galvanized steel with exterior coating as specified below. All panel seams shall be caulked and sealed for an airtight unit. Leakage rates shall be less than 1% at design static pressure. 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 according to the customer's selection.

### D. Double Wall Thermal Break Construction

1. Each unit shall have double wall construction with 20 gauge internal solid liner. Internal liner shall be G90 throughout with an exception of cooling coil sections where liner must be 304SS. Thermal break construction must insure R-Value no less than 14 BTU/hr-ft<sup>2</sup>-degF for the whole cabinet envelope including walls, roofs, doors, base etc. Wall and roof panel splits or supporting frame work must also comply with R14 requirement.

### E. Insulation

1. Entire unit to be insulated with a full (4)" thick fiberglass insulation 3 lbs/cu.ft density. All insulation edges shall be encapsulated within the panel.

### F. Access Doors

1. The unit shall be equipped with a solid double wall insulated, hinged access doors as shown on the plans. The door frame shall be built with the thermal break barrier and full perimeter gasket. The door hinge assembly shall be continuous SS piano hinge type. 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. Each access door must be equipped with the view window.

### G. Fans

1. Plug Fan (PF) 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, 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 rated in accordance with AMCA 210 for performance and AMCA 300 for sound.
2. Backward Inclined (BI) SWSI housed fans: The fans shall be capable of operating over the entire class range in accordance with the equipment schedule and as defined in AMCA Standard 99-2408. Fan wheels shall utilize non-overloading airfoil blades in all sizes. Flat, single thickness blades are not acceptable. Unless otherwise

directed, fans shall be compliance with the layout shown on the drawings. Fan housings are to be heavy gauge, continuously welded construction. Housings with lock seams or partially welded construction are not acceptable. Housings are to be reinforced with rigid bracing to increase structural integrity and prevent vibration. Housing inlet cones shall be aerodynamically designed and spun providing a minimum separation of air flow. Wheel diameters and outlet areas shall be in accordance with the standard dimensions adopted by AMCA for centrifugal fans. Designs not in accordance with AMCA Standard 99-2401 are not acceptable. Bearings are to be heavy duty, grease lubricated, precision antifriction ball or spherical roller, self-aligning, pillow block design. Bearings shall be designed for a minimum L-10 life of 40,000 hours (200,000 hour L-50 life) when rated at the fan's maximum cataloged operating speed. Shafts are to be ASTM A-108 steel, grade 1040/1045, precision turned, ground and polished. Grade 1018 steel is not acceptable. The shaft's first critical speed shall be at least 125% of the fan's maximum operating speed for each fan class. The drive end of the fan shaft shall be counter-sunk for tachometer readings. All fan wheels shall be dynamically balanced on precision balancers. Prior to shipment, completed fans with motors shall receive a final test balance at the specified operating speed.

3. The following fan options shall be provided:
  - a. Pressure relief fittings furnished on all bearings.
  - b. 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 seismically restrained 2" deflection isolator.
  - d. Fully welded structural steel base. The base shall be constructed from minimum ¼" thick structural members. Steel base shall have minimum 3 mil epoxy coating.

#### H. Motors

1. Motors shall be NEMA Design B; TEFC 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 meet the electrical characteristics as specified for voltage, rpm, and efficiencies according to the Equipment Schedule.

#### I. 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 stainless steel

non-cascading 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 Copper with 3/4" vent and drain provided for complete coil drainage. Return and Supply coil connections shall be extended to the exterior of the unit casing by the manufacturer. Vent and drain connections shall be accessible from the inside of the AHU. 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 5/8":

- ( ) 5/8" o.d. x .020" wall copper tube with .028 return bends.
- ( ) .006" aluminum fins
- ( ) 16 gauge 304SS steel casing

#### L. Standard heating coils

1. Heating coils shall be mounted on painted carbon steel support rack to permit coils to slide out individually from the unit. Standard heating 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 Copper Intermediate tube supports shall be supplied on coils over 44" fin length, with an additional support every 42" multiple thereafter.

#### M. 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 .09 3003H-14 aluminum. All pans are to be double sloped 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, 2" 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.

#### N. Filter Gage

1. Each Filter bank shall be furnished with:
  - a. Magnehelic filter gage (Dwyer Series 2000)

#### O. 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.

#### Q. Damper Louver Combinations

1. Provide extruded aluminum damper louvers combination for all OA openings. Damper louver combo shall be drainable type with built in downspouts and birdscreen. Provide mounting flange on the upstream or downstream of the damper louver combo to insure installation according to the drawings.

#### R. Rain Hood

1. Rain hoods shall be fabricated from same material as unit casing with expanded metal inlet screen. Hoods sized to minimize moisture carry over.

#### S. Electrical

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

1. The fan motor shall be wired to a junction box mounted on unit exterior.
2. The unit shall be equipped with vapor proof fluorescent light fixtures with guards. Units with the limited space shall be provided with vapor proof incandescent light fixtures with guard
3. Lights shall be controlled by two three-way light switches mounted adjacent to the supply air and return fan access doors.
4. Furnish a 120 volt duplex convenience outlet on the exterior of the unit. Locate the outlet next to the fan section access door. 120 V power drop shall be provided by field electrical contractor.