

## SECTION 15780

### THE POOL SYSTEM GENERAL SPECIFICATIONS

#### Part 1 – GENERAL

##### 1.01 DESCRIPTION:

- A. This section of the work includes the design, fabrication, testing, cleaning and packaging, and shipment of pool dehumidification units by the unit manufacturer in complete accordance with the following specification.
- B. The details outlined and the component manufacturers named in this specification may not be deviated from in the air handling unit manufacturer's preparation of the bid, even where techniques are required which are not considered standard by the manufacturer. The construction as described in this specification is considered essential, and any deviation from this specification must be specifically identified and bid only after complying with the specification defined as the base bid.

##### 1.02 QUALITY ASSURANCE:

- A. Comply with all state or local construction codes.
- B. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified or as denoted on the drawings and schedule.
- C. Verify size and locations of all ductwork connections.
- D. Fans shall be rated in accordance with AMCA Standard 210 for performance and AMCA Standard 301 for sound. Motors shall meet requirements of MEMA, IEEE, ANSI, and NEC standard. Coils shall be rated in accordance with ARI Standard 410 and bear the ARI seal.
- E. Equipment within unit shall be UL listed where applicable.

##### 1.03 SUBMITTAL:

- A. Provide the following detailed information on the equipment proposed Unit manufacturer shall itemize all deviations from the specified requirements. If not so indicated, unit manufacturer will be required to furnish at no cost to the owner:
  - 1. Information requested in the RFQ, including equipment data sheets, schedules and sketches.
  - 2. Equipment drawings showing dimensions, weights (shipping & operating), configuration, major component locations, access door locations, duct connection sizes and locations, and shipping split locations.
  - 3. Fan manufacturer and performance curves with the operating points clearly indicated. Motor sizes and types.
  - 4. Coil selections with sizes, rows, fin spacing, face velocities, temperatures, flow rates, pressure drops, & connection sizes.
  - 5. Proposed filters indicating size, efficiency, and pressure drop.
  - 6. Materials of construction for housing and major components.
  - 7. Airborne and transmitted sound power levels by octave band.
- B. Make submittals in accordance with requirements of conditions of purchase. Submittals shall show Buyer's purchase order number, equipment number and project number. Information shall include, as applicable, but not be limited to the following:
  - 1. Information submitted with quotation, revised and expanded as required.
  - 2. (If applicable) Electrical data, wiring diagrams, and accessory panel layouts. Clearly differentiate between portions of wiring that are factory-installed and portions that are field-installed.
- C. AFTER RECEIPT OF APPROVED DRAWINGS: Submit manuals with detailed description of installation, operation, and maintenance, including the following:
  - 1. Installation requirements including assembly instructions, lifting requirements and adjustments.
  - 2. Manufacturer's literature describing each piece of equipment furnished including operation instructions which includes step by step preparation of starting, shutdown, and draining and maintenance instructions including lubrication.

**1.04 PRODUCT CLEANING, DELIVERY, STORAGE, AND HANDLING:**

- A. Thoroughly clean equipment, components, and subassemblies of water, dirt, debris, weld splatter, grease, oil, and other foreign matter prior to shipment.
- B. Seal and protect all openings in unit casings, housings and enclosures with thin gauge sheet metal closure sheets.
  - 1. Seal closures, caps and plugs dust tight and moisture tight.
  - 2. Protect pipe threads with plastic end caps or plugs.
  - 3. Provide full charge of proper lubricant for grease lubricated bearings.
- C. If equipment is to be stored before use, shipping protection provided by the unit manufacturer shall remain on the unit until the unit is installed. Manufacturer shall submit written recommendations for field storage, both indoor and outdoor.
- D. Provide non-corrosive nameplate permanently attached to the equipment containing the following information:
  - 1. Manufacturer's project/serial number
  - 2. Plant name and location
  - 3. Customer equipment number
  - 4. Date of manufacture

**1.05 WARRANTY:**

- A. All equipment, materials, and workmanship shall be warranted for twelve (12) months from startup or eighteen (18) months from shipment, whichever period expires first. During the warranty period, the manufacturer shall repair or replace, at no additional cost to the Owner, any workmanship in which defects may develop. Any defective purchased parts, such as fan wheels, motors, and controls, will be repaired or replaced under warranty.

**PART 2 – MATERIALS**

**2.01 MANUFACTURERS:**

- A. Provide pool dehumidification unit as manufactured by: Efficient Air Systems, Inc. or approved equal by the engineer.
- B. Alternate pricing based on pre-approved manufacturers will be considered if the following performance requirements and construction techniques are adhered to in all respects. Any substitutions shall be approved by the Architect/Engineer/Owner in writing ten (10) days prior to bid.

**2.02 POOL DEHUMIDIFICATION EQUIPMENT:**

- A. Pool dehumidification unit shall be of the configuration, capacity, and style as indicated on the drawings and Equipment Schedule and as specified herein. Through properly designed access; ease of maintenance, removability of components, and unit serviceability shall be assured.
- B. The unit shall be constructed for (choose one) indoor/outdoor installation. Outdoor unit to be provided with weatherproofing and back draft shutters.
- C. Provide baffling between internal components and unit cabinet to prevent air bypass. Baffle material shall match unit interior. All seams or voids between baffles, components, and unit cabinet shall be caulked and sealed airtight.
- D. Unit is to be shipped factory assembled in one complete section, when possible.

**2.03 ENCLOSURE:**

- A. The unit enclosure shall be constructed of minimum 16 gauge Stucco finish aluminum with welded and ground corners. The interior skin shall be 20-gauge smooth mill finish aluminum.
- B. Unit shall be furnished with 1.5" rigid polyisocyanurate insulation having an R-value of 12.25 in the walls and 2" rigid polyisocyanurate insulation having an R-value of 14 in the roof. The insulation is fully encapsulated to prevent combustion.
- C. Exterior panels shall be fastened in place with internal stainless steel fasteners. Plated or galvanized fasteners are unacceptable.

- D. All roof and wall seams shall be sealed against water and air leakage. Roof shall have a drip edge to keep water away from access doors and openings.
- E. Access doors shall be gasketed, insulated, double wall construction. Gasketing shall be ¼” to insure positive seal during operation. Access doors shall be hinged on one side using aluminum piano type hinges. Access doors shall be fastened in place with quarter turn compression latches. A hood shall be provided over the fresh air intake for outdoor installations. Steel panels are not acceptable.
- F. All ductwork penetrations through unit enclosure shall be provided with framed openings of size indicated on drawing. Openings to be provided with flanged duct connections of same material as cabinet interior extending a minimum of 1½” from the surface of unit casing.
- G. Removable access panels shall be provided as indicated on drawing for easy service and maintenance.

#### 2.04 BASE AND FRAMES:

- A. The unit shall sit on a welded structural steel base made out of a minimum of 3” x 2” tubular steel. Cross members will be used to support internal components and to prevent the unit from sagging, pulsating or oil canning. Base shall be cleaned, prime coated, then painted with two coats of epoxy. Systems weighing less than 2000 lbs may have formed steel bases.
- B. Lifting lugs will be provided for units that require lifting above ground level.
- C. Unit floor shall be constructed of minimum 14-gauge mill finish aluminum. Aluminum shall be bent and welded into a pan to contain moisture within the unit. Unit base shall have a minimum three inches of R-24.4 rigid polyisocyanurate insulation. Underside of base shall have minimum 18 ga. aluminum skin.
- D. All service openings penetrating the unit base shall have minimum 2” upturned flanges with welded seams and covered with thin gauge aluminum to prevent moisture from entering the openings. Penetrations by contractors shall be sealed by the respective contractor.
- E. Provide stainless steel drain pans in the exhaust and cooling coil sections. Pans shall be fully welded and tested. Drain pans shall be pitched to prevent standing water. Galvanized drain pans are not acceptable.

#### 2.05 FILTERS:

- A. Provide all filters of number, size and capacity as required for air handling system indicated on drawings and as stated in these specifications. Filters to be selected for maximum face velocity of 500 fpm at unit rated capacity.
- B. Filter banks are provided for both return air and outside air consisting of 2” thick disposable air filters rated at not less than (30%) based on ASHRAE 52-91.

#### 2.06 DAMPERS:

- A. The dampers shall be opposed blade to allow maximum control of airflow to the unit. Damper blades shall be Aluminum with airfoil shape to enhance performance. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow and operation in either direction through the damper. (blades that are nonsymmetrical relative to their axle pivot point or utilize blade stops larger than ½ in. are unacceptable). Blade seals shall be extruded vinyl for 180°F maximum temperature. Linkage shall be blade-to-blade concealed in jamb (out of the air stream) to protect linkage and reduce pressure drop noise.
- B. Damper frame shall be Heavy Gauge Aluminum, formed into a structural hat channel shape with reinforced corners to meet 11 ga. criteria. Bearings shall be corrosion resistant, permanently lubricated, synthetic (acetal) sleeve type rotating in extruded holes in the damper frame for maximum service. Axles shall be square and positively locked into the damper blade. Jamb seals shall be flexible aluminum compression type to prevent leakage between blade end and damper frame.
- C. The Dampers Manufacturer’s submittal data shall certify all air performance pressure drop data is licensed in accordance with the AMCA Certified Ratings Program for Test Figures 5.2, 5.3, and 5.5. Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D.
- D. Damper manufacturer’s printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 5 in. wg, velocities to 3000 fpm and temperatures to 180°F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Air Balance Model # 526.

- E. Electric actuators shall be provided by the (choose one) manufacturer/controls contractor and shall be spring return type actuator on the fresh air and a (choose one) non-spring/spring return type actuator on the recirculation damper .

**2.07 FANS:**

- A. The supply and exhaust fan wheels shall be non-overloading aluminum airfoil backward incline wheels. Blades on all sizes and classes shall be securely welded to both a deep spun inlet shroud and to a heavy back plate. All wheels shall be carefully trued after assembly. Wheels shall be balanced in accordance with AMCA Standard 204-96.
- B. Inlet cones shall be constructed of heavy gauge spun aluminum and carefully matched to the wheel shroud.
- C. Acceptable wheel and cone manufacturer: Twin City.
- D. Fan frames shall be constructed of minimum 2" x 3" welded structural tube to provide strength and seal against moisture. Frames shall be cleaned, prime coated, then painted with two coats of enamel. Fan frames shall be isolated from unit frame with guided spring isolators. Bolted or screwed frames are not acceptable.
- E. Plenum fans shall be arrangement 4 direct drive configuration and shall be statically and dynamically balanced as a complete assembly to a maximum vibration level of two mils in any plane. Flexible duct connectors shall be used to isolate the fan from the unit housing. Forward curve or belt driven fans are not acceptable.

**2.08 MOTORS:**

- A. The fan motors shall be nominal 1800 or 1200 RPM, (choose one) 208V, 230V, 460V/3ph/60Hz premium efficient, (choose one) ODP, TEFC enclosure.
- B. Motor shall be of HP listed on the schedule; selected to provide adequate torque throughout the entire range of fan operation and not exceed nameplate HP when fan operates at synchronous motor speed.
- C. Motor shall be designed for continuous duty operation, NEMA design B with class F insulation. The motor shall be suitable for operating with variable frequency drives without undue noise, vibration, or deterioration of reliability and life.
- D. Motor electrical connection shall be factory wired to factory mounted variable frequency drives.
- E. Acceptable motor manufacturer: Toshiba.

**2.09 VFDS:**

- A. The fan motors shall be controlled by factory installed variable frequency drives to insure maximum operating efficiency.
- B. Acceptable VFD manufacturer: (choose one) Mitsubishi, Reliance, Sumitomo.

**2.10 CONTROLS:**

- A. The system shall include a factory installed, wired, and tested DDC control system with the following standard features:
  - 1. The DDC system continually monitors room air temperature, humidity, and differential pressure (optional), return air temperature, outdoor air temperature, and discharge air temperature.
  - 2. The DDC system shall use input data to efficiently regulate the amount of fresh air required to control and maintain the desired temperature and humidity levels in the pool area.
  - 3. The DDC system shall be provided with one of three forms of customer interface:
    - a. Remote control pad
    - b. BACnet connection for existing control system using Ethernet, RS-232, or RS485 connection
    - c. Remote PC connection.

**2.11 HEAT RECOVERY:**

- A. The heat recovery apparatus shall be a heatpipe.
- B. The heatpipe shall have 0.006" thick aluminum fins. Fin density shall be 14 fins per inch. The tubes shall be minimum 0.020" thick, ½" diameter copper. Casing shall be 16 gauge galvanized steel.
- C. The heatpipe shall be charged and sealed with R-22.
- D. Average heat recovery shall be no less than 50%. The configuration of airflow through this exchanger shall be counter flow for maximum performance. Parallel flow or cross flow shall not be acceptable. Heat wheels and plate exchangers are not acceptable.
- E. Acceptable heatpipe manufacturer: Precision Engineering and Fabrication.

**2.12 HEATING COIL:**

- A. The system shall be furnished with a hot water coil of size and capacity as required for air handling system indicated on the drawings and as stated in these specifications. Coils to be selected with maximum face velocity of 800 fpm; maximum head pressure loss of 20 ft.
- B. Coils shall have minimum 0.020" thick, 5/8" diameter, copper tubes, 0.0075" aluminum fins, nonferrous headers with min. ½" dia. MPT drain and vent connections. Coil fin spacing shall not exceed 14 fpi.
- C. Coil casing shall be minimum (choose one) 16 ga. galvanized/16 ga. stainless steel.
- D. Coils shall be circuited to provide the required performance; the use of internal restrictive devices, or turbulators, to obtain turbulent flow will not be acceptable.
- E. Supply and return connections are to be extended and sealed through the cabinet wall. Provide a factory piped 3-way Belimo ball valve.
- F. Acceptable coil manufacturer: Precision Engineering and Fabrication.

**2.13 COOLING COIL: (optional)**

- A. The system shall be furnished with a direct expansion coil of size and capacity as required for air handling system indicated on the drawings and as stated in these specifications. Coils to be selected with maximum face velocity of 500 fpm.
- B. Coils shall have minimum 0.020" thick, 5/8" diameter, copper tubes, 0.0075" aluminum fins, nonferrous headers. Coil fin spacing shall not exceed 14 fpi.
- C. Coil casing shall be minimum (choose one) 16 ga. galvanized/16 ga. stainless steel.
- D. Coils shall be circuited to provide the required performance.
- E. Acceptable coil manufacturer: Precision Engineering and Fabrication.

**2.14 ELECTRICAL**

- A. Provide single point power connection.
- B. Electrical components shall be rated for (choose one) 208V, 230V, 460V/3 ph/60 Hz power supply. Provide 208V/230V units with distribution block for three phase power plus a neutral. For 460V units provide single phase 2kVA step-down transformer with 460 VAC primary and 120VAC secondary connections for control section power.
- C. All units shall contain a grounding conductor.
- D. Provide 15 Amp GFI service outlet located in the control section of the unit.
- E. All variable speed drives, motors, and controls shall be factory wired and tested. VFD to motor connection shall be made through liquidtight flexible conduit. All control wire connections shall be made through rigid PVC conduit.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. Install unit in strict accordance with manufacturer’s instructions.**
- B. Pipe condensate drain with properly sized “P” trap as shown.**
- C. Electrical contractor to provide disconnect switch.**
- D. Electrical contractor shall install and terminate (choose one) 208V, 230V, 460V, three phase power to the disconnect switch and terminals in the high voltage section mounted on the unit.**

**3.02 START-UP**

- A. Start-up service shall be provided by the equipment manufacturer’s authorized representative and shall include complete testing of all controls and unit operation. The agency responsible for start-up shall record the air and electrical operating data. Copies of this data to be supplied to the Owner.**
- B. Unit shall be thoroughly cleaned in accordance with the manufacturer’s instructions prior to being placed into service.**
- C. A complete operating and maintenance manual, including wiring diagrams, start-up and operating sequence, and material list shall be provided to the Owner.**
- D. The Owner shall be provided with complete instruction of operating and maintenance procedures.**

**END OF SECTION 15780**