SECTION 236100 – EVAPORATIVE COOLERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes evaporative coolers consisting of a blower section and cooling section(s).

1.2 SUBMITTALS

A. Product Data:
   1. Provide dimensions, weights, capacities at scheduled conditions, required clearances, components, accessories, and Electrical requirements,
   2. Location and size of each field connection.
   3. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
   4. Design of the support structure

B. Operation and Maintenance data

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Evaporative Coolers: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning" and Section 10 - "Other Equipment."

D. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.4 WARRANTY

A. Manufacturer's standard warranty form in which manufacturer agrees to repair or replace components of evaporative coolers that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Fan, motor, drive shaft, bearings, and motor supports.
   b. Tube bundle.
   c. External-circuit circulating pump.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 COMMERCIAL STYLE EVAPORATIVE COOLERS

A. Manufacturers:
   2. Phoenix Manufacturing, Inc.
   3. United Metal Products, Inc.

B. Cabinet Design:
   1. Discharge Openings: Standard unit construction is to include horizontal or vertical air discharge as indicated on Drawings.
   2. Cabinet to be fabricated of 20 gauge hot dipped galvanized steel with electrostatically-applied polyester-epoxy powder-based coating.
   3. Each standard model is to include one (1) removable panel providing access to blower motor drive.

C. Blower Section:
   1. Fan: Forward curved or backward-inclined type, rated according to AMCA 210; statically and dynamically balanced, galvanized-steel, centrifugal fan mounted on solid-steel shaft with one (1) set of heavy-duty, self-aligning, prelubricated ball bearings on each side of the fan wheel and an adjustable V-belt drive with matching motor sheaves and belts.
      a. Fan wheel and fan pulley shall be keyed to shaft.
   3. Controls: Switches on thermostat as indicated on Drawings or as required per the sequence of operations.
D. Cooling Section:

1. Tank: 18 gauge, 304 stainless steel or hot dipped galvanized steel with electrosotatically-applied polyester-epoxy powder-based coating.
3. Water Distribution Header: Copper or PVC header pipe with ports drilled for proper water flow.
4. Pump: Heavy duty submersible pump with balancing valve on discharge for proper water flow and carry-over prevention.
5. Float Valve: Cast brass 3/8" float valve; commercial grade.
6. Saturating Efficiency: 88% minimum rated at 700 FPM maximum face velocity; 91% efficiency rated at 500 FPM face velocity.

2.3 INDUSTRIAL STYLE EVAPORATIVE COOLERS

A. Manufacturers:

1. AZ Evap
2. Energy Labs, Inc.
3. United Metal Products, Inc.

B. Cabinet & Frame:

1. Single wall, minimum 16-gauge, 304/316 stainless steel construction with stainless steel industrial hex-head fasteners to secure to the tubular steel frame.
2. Weather-tight roof assembly.
3. Supply air discharge as shown on the Drawings.
4. Provide one GFI receptacle on exterior of the unit.
5. Provide internal marine light in each section with weatherproof switch.
6. Base frame shall be full perimeter, 10 gauge stainless/galvanized steel with C-channel steel cross members for supporting floor and major components. Integral steel frame shall be constructed so that all exterior panels are not load bearing members.
7. Provide lifting lugs attached to frame as needed.
8. No part of the base frame shall be used as a reservoir to contain water.
9. Unit’s roof curbs, when needed, shall be furnished by the manufacturer and fabricated of 14-gauge stainless steel, welded, with an integral wood nailer. Cant strip and insulation by others.

C. Floor:

1. Provide 14 gauge, continuously welded 304/316 stainless steel floor that spans the entire length and width of the evaporative cooler. All unit
components such as reservoirs, sumps, fan and motor bases shall be mounted above the flooring.

2. The floor shall be designed with adequate underbracing to eliminate any “oil canning” from foot traffic inside the unit.

D. Access Door:

1. Provide hinged, double wall, thermally insulated and gasketed 304/316 stainless steel access doors.
2. Provide a minimum of two heavy-duty compression latches on each door, Ventlock 260 or equal, so that each door can be opened from the inside for safety of O&M personnel.
3. Access doors shall be sized so as to easily remove the largest piece of internal equipment without dismantling that piece of equipment.

E. Supply Fan:

1. Fan Shaft: Shaft shall be made of stress-relieved, ground and polished stainless steel. Shaft critical speed shall be 20 percent higher than the maximum operating speed.
2. Fan Wheel: Mild steel, baked epoxy-coated or baked phenolic-coated.
3. Fan Type: Airfoil centrifugal, AMCA Class 1.
4. Bearings: Anti-friction, self-aligning, pillow block greaseable ball bearings, rated for 200,000 hours L-10 life, with extended lube lines for easy access.
5. Drives: Belt drive with minimum horsepower capacity of 150% of nameplate horsepower. Sheave of non-adjustable type with removable machined bushings and keyed shaft, dynamically balanced at factory.
7. Entire fan, motor and drive assembly shall be mounted on a steel base and supported with spring vibration isolators.
8. Fan shall be tested and rated in accordance with AMCA standard 210.

F. Fan Motor & Drives:

1. Motor for supply fan shall be furnished and installed by the evaporative cooler manufacturer.
2. Motor speed shall be 1800 RPM maximum.
3. Service factor shall be 1.15 or greater and rated for continuous operation at full load amps.
4. Motor shall be cast iron “high efficiency” design and rated in accordance with NEMA test standard MG1-12.53a (IEEE 112 test standard, method B).
5. Ball bearings shall be cool running, anti-friction bearings with double-shielded lubrication parts on each side. Bearing life shall be 200,000 hours (AFBMNA “FF”, L-10).
6. Name plates shall be stamped with NEMA Standard information, bearing I.D. and lubrication instruction.
7. All sheaves, fixed or variable, shall not exceed the hp rating of the motor.

G. Vibration Control:
1. Install fan/motor assembly on open-spring vibration isolators having a minimum of 1-inch static deflection and side snubbers.
2. Provide flexible connector between fan housing and cabinet.

H. Direct Evaporative Cooling Section:
   1. Media:
      a. Media shall be GLASdek as manufactured by Munters Corp., or equal. UL 900, Class 2 rating, with a minimum evaporative effectiveness of 88 percent, designed for maximum entering air velocity of 500 feet per minute.
      b. Media shall be cross-fluted design, self-cleaning and unaffected by atmospheric dust or sand.
      c. Thickness shall be 12-inches in the direction of airflow, including 4-inch removable pre-evaporative section.
      d. Provide Type 304L stainless steel media holding rack.
      e. Design shall allow for no water carry over to the fan section at any time.

   2. Recirculating water pump, self priming:
      a. Recirculating water pump shall be centrifugal, submersible type constructed of cast bronze with bronze or stainless steel trim.
      b. Pump capable of delivering 1.5 GPM per square foot of horizontal media area.
      c. Pump shall have suction strainer, thermal and low water cut-off protection.

   3. Sump tank:
      a. Sump tank shall be made of minimum 16 gauge, Type 304 or 316 stainless steel with fill, drain and overflow connections.
      b. The reservoir/sump shall not be integral to the base frame or flooring. The sump shall be constructed as a separate component and secured in place on top of the unit flooring.
      c. Provide an adjustable float-operated brass valve for controlling the water level in the sump tank.

   4. Water distribution piping:
      a. Distribution piping for recirculating water shall be Type L copper throughout the entire unit.
      b. Distribution headers shall have manual valves for balancing of water flow over evaporative media.

   5. Flushing System:
      a. Provide a factory wired and plumbed, distribution header flushing system. The automated flush shall be fully adjustable, utilizing a low
b. The flushing system shall provide a means of preventing the clogging of the header and an adjustable method of bleed off. A timed drain event from the sump is not an acceptable means of bleed.
c. Provide a dedicated, internally mounted and wired normally closed solenoid valve for flushing, with manual ball valve for isolation.

6. Protection of Dissimilar Metals
   a. All stainless material shall be properly isolated to prevent dissimilar metal contact.

I. Intake Louvers:
   1. Type 304 or 316 stainless steel, or aluminum outside air intake with 4-inches deep, 45 degree rainproof, drainable louvers.
   2. Provide 1/2-inch mesh, bird screen mounted in a frame.

J. All bolts, nuts and washers utilized shall be Type 410 stainless steel.

K. Unit Control Panel & Electrical:
   1. Provide NEMA 3R type panel factory-mounted and wired.
   2. Control and power wiring shall be in accordance with UL and NEC requirements.
   3. Provide single point power connection.
   4. Provide unit thermal magnetic disconnect switch, required 120 volt power transformers and 24 volt control transformers, fuses and fuse clips, marked terminal strips and NEMA rated or IEC magnetic starters with overload protection in each phase for all three phase motors.
   5. Provide a safety switch at fan access door to automatically deenergize fan upon opening door.
   6. Provide a manual switch on exterior of unit adjacent to fan access door to enable maintenance personnel to deenergize fan prior to entering fan section.
   7. Provide a remote-mounted low voltage HIGH-COOL/LOW-COOL/HIGH-VENT/LOW-VENT/OFF mode switch. Furnish cabling of sufficient wire size to enable the mode switch to be installed up to 150 feet away from the Unit Control Panel.

   a. When the mode switch is placed in the HIGH or LOW COOL position, the fan and pump shall both operate. The fan speed shall be high or low depending on the switch setting.
   b. When the mode switch is placed in HIGH or LOW VENT position, the fan shall operate and the pump shall be deenergized. The fan speed shall be high or low depending on the switch setting.
   c. When the mode switch is placed in OFF position, fan and pump shall be deenergized.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install [ground] [roof]-mounted units on neoprene pads with 0.15 inch static deflection; refer to Division 15 Section “Mechanical Vibration and Seismic Controls.”

B. Install roof-mounted units on curbs complying with requirements in Division 7.

C. Install coolers on concrete base. Concrete base is specified in Division 15 Section “Common Work Results for HVAC,” and concrete materials and installation requirements are specified in Division 3.

D. Concrete Bases: Anchor coolers to concrete bases with stainless steel anchor bolts.
   1. Install dowel rods to connect concrete base to concrete floor, where applicable. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of the base.
   2. For equipment supported on structural slab, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Cast-in-place concrete materials and placement requirements are specified in Division 3.
   5. Concrete base shall be level prior to setting cleaning system. If required, use grout to assure a level surface.

3.2 CONNECTIONS

A. Maintain manufacturer’s recommended clearances for service and maintenance.

B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Install piping adjacent to coolers to allow services and maintenance.

D. Connect drain lines to nearest floor sink, or other location as indicated on Drawings.

E. Domestic Water Piping: Comply with applicable requirements in Division 15 Section “Domestic Water Piping.” Connect to water-level control with shut-off valve and union or flange at each connection.

F. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories.

G. Make final duct connections to evaporative coolers with flexible connectors. Flexible connectors are specified in Division 15 Section “Duct Accessories.”
H. Install ducts adjacent to evaporative coolers to allow service and maintenance.

I. Electrical System Corrections: Comply with applicable requirements in Division 16 Sections for power wiring, switches, and motor controls.

J. Ground equipment according to Division 16.

3.3 FIELD QUALITY CONTROL

A. Operation Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

B. Test & adjust controls and safeties. Replace damaged & malfunctioning controls and equipment.

C. Shut unit down and reconnect automatic temperature-control operators.

D. Refer to Division 17 Section “Testing, Adjusting, and Balancing” for testing, adjusting, and balancing procedures.

E. Adjust or replace fan and motor pulleys as required to achieve design airflow.

END OF SECTION