SECTION 23 65 00

COOLING TOWERS

1.0 GENERAL

1. DESCRIPTION
   1. All work specified in this Section is governed by the Common Work Results for HVAC Section 23 05 00.
   2. This Section 23 65 00 and the accompanying drawings cover the provisions of all labor, equipment, appliances, and materials and performing all operations in connection with the construction and installation of \*\*induced \*\*forced\*\* draft cooling towers as specified herein and as shown.
   3. Cooling towers larger than 2000 cubic feet in volume shall be FM-approved and contain no combustible materials. Multiple-cell towers shall be considered a single "cooling tower" when determining this volume. This volume shall be calculated and included with the cooling tower submittal. Reference NFPA 214, 1-1, Scope.
   4. Cooling tower performance shall be certified by the Cooling Tower Institute.
2. INTENT
   1. It is the intent of this Section of the specifications to provide complete, operable, balanced cooling towers as shown and specified which are free of leaks, excessive drift and water carryover, vibration and cycling.
3. BASIS OF DESIGN
   1. The basis of design is as scheduled. Any proposed substitutions shall be proven equal in all respects to the equipment specified as the basis of design. Any modifications to piping, electrical work, controls, support structure, etc., that result from any substitution shall be coordinated with all trades. This coordination shall occur before delivery of equipment and any modifications shall be performed without incurring additions to the Contract.
4. ACCEPTABLE SUBSTITUTE MANUFACTURERS
   1. Acceptable substitute manufacturers are Evapco, Marley, and Baltimore Air Coil, provided that their size, performance, electrical and physical characteristics are equal in all respects to the basis of design for this specific project.

2.0 PRODUCTS

1. CONSTRUCTION
   1. Structural components of the tower, including the framework, mechanical equipment supports, casing, hot water distribution basins, fan deck, and fan cylinder shall be fabricated of heavy-gauge steel, protected against corrosion by G-210 hot-dip galvanizing. All components subjected to factory-welding and cutting shall be galvanized after completion of fabrication to a zinc-thickness equivalent of G-210.
   2. The cold water basin and supports shall be constructed of 304 stainless steel.
2. FILL
   1. The tower fill shall be FM-approved, self-extinguishing PVC.
   2. Drift eliminators shall reduce drift to a maximum of \*\*0.002% (counterflow) \*\*0.005% (crossflow) of the scheduled flowrate.
3. DISTRIBUTION BASIN
   1. The distribution basin shall have removable and replaceable polypropylene or ABS nozzles installed in the floor of the basin and shall provide full coverage of the fill by gravity flow or through a PVC spray header utilizing not more than a 5.0 psi pressure drop at full flow. Spray header shall be suitable for at least 50% water flowrate turn down.
   2. The distribution basin shall have basin covers.
4. FAN AND DRIVE
   1. Fan shall be fixed-pitched axial propeller type; statically balanced. Fan shall be driven through solid back "Power Band" V-belt(s) with a minimum service factor of 1.50 based on full motor HP or through an oil-filled gearbox. The fan and fan pulley shall be mounted on two (2) grease or oil-lubricated bearings. An oil reservoir cup with spring loaded cap or extended grease lines shall be provided to supply oil or grease to the bearing housings.
   2. Motor(s) shall be T.E.A.O., premium-efficiency, variable speed type; complete with compatible HOA starters. Motors for variable speed operation shall be inverter-duty type and provided and installed with shaft grounding rings.
5. ACCESSORIES
   1. Accessories shall include, but not be limited to, the following:
      1. \*\*Electronic water level controller\*\*Float-operated make-up water valve with electric microswitches complete with remote low-voltage, electric solenoid-type, make-up water valve, and probe with high level alarm, fill stop, fill start, and low level alarm. Make-up water valve shall have no more than 10 psi pressure drop at peak make-up water flow as calculated by the Manufacturer, or as indicated on the plans, whichever is greater. Sensor shall be stainless steel probes mounted external to tower basin in a clear plexiglass stilling well.
      2. Electric basin heater with factory-wired thermostat and low-water cutout.
      3. Stainless steel suction strainer/anti-vortex screen.
      4. Stainless steel \*\*bottom\*\*side outlet sump boxes.
      5. Motor davit arm and davit mount.
      6. \*\*Manufacturer-supplied ladder and catwalk system for access to the external fan motor.
      7. \*\*Manufacturer-supplied ladder to top of unit, perimeter handrails, etc.
      8. All ladders, platforms, walkways, etc. shall meet OSHA standards and shall include all safety cages, railings, etc.
   2. Provide each connection to the tower with a butterfly valve. The butterfly valves required for servicing and balancing the flow to each tower may be replaced by the Tower Manufacturer's balancing valve provided that the valve can accomplish leak-tight shutoff.
   3. Factory-installed equalizer piping connections to each basin with isolation valves to allow each basin to be isolated.
   4. Each cell shall be equipped with a mechanical vibration isolation switch with alarm contact. Switch shall be resettable local to the switch only – electronic remote reset is not acceptable.
   5. Each cell shall have hot water basin weir dam for not less than 50% turndown.
   6. \*\*Internal walkways.
   7. \*\*Single-point piping connection - internal piping connection between hot decks in one cooling tower cell.
6. \*WATER FILTRATION UNIT AND SWEEPER PIPING\*
   1. Water filtration shall be a factory-assembled unit and shall include filter tank, \*\*filter media, pump, piping, control panel, three way diverting valves, and \*\*containment tanks as necessary to limit the maximum discharge rate to 50 GPM. Systems shall be by PEP/Amiad, Lakos, or approved equal.

* 1. \*\*Sand filter media tank shall be constructed of \*\*fiberglass reinforced plastic \*\*stainless steel with a maximum pressure of 50 psi. Tank shall be provided with an internal under drain piping assembly designed to equally distribute the water over the filter media. Tank shall be designed and sized for a maximum of 20 GPM per square foot of filter media surface area.
  2. Filter pump shall be bronze construction closed coupled centrifugal type with open face impeller and mechanical seal. Pump shall be provided with a basket type pre-strainer with removable basket.
  3. Filter unit shall be provided with a complete system of automatic control to provide stand-alone automatic operation of the filter unit. All controls and controllers shall be mounted in a NEMA 3R enclosure and mounted on the filter unit assembly. Control panel shall include electrical disconnect, 24-hour timer, differential pressure switch, overload and short circuit protection. Control panel face shall have electrical disconnect switch and manual backwash push-button.
  4. Unit piping shall be Schedule 80 PVC, ASTM-D-1784 grade 1 with threaded fittings conforming to ASTM-F-437.
  5. Sweeper piping shall be Schedule 80 PVC piping and shall be provided with flow enhanced nozzles. Nozzles shall be rated for maximum of 8 GPM. Quantity of nozzles shall be selected for filter GPM. Sweeper piping exposed to freezing conditions shall be heat traced and type L copper piping.
  6. Water filtration control panel shall communicate to the Energy Management System on/off status and alarm status.

3.0 EXECUTION

1. INSTALLATION
   1. The cooling towers and accessories shall be installed in strict accordance with the manufacturer's recommendations and the Contract Documents.

END OF SECTION