

SECTION 15710

COOLING TOWERS

PART 1 DESIGN DIRECTIVES

1.1 DESIGN CRITERIA

- A. Consultant shall determine & specify the required live load and wind load for the application.
- B. All towers shall be designed for 74°F wet bulb at 500' above sea level.
- C. Drift losses shall not exceed 0.005% of the maximum circulating water flow.
- D. Consultant shall provide a sanitary, not storm, drain for draining the cooling tower.
- E. Return and supply pipe between the tower & the tower isolation valves shall be schedule 80 PVC pipe.

1.2 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of factory-fabricated cooling towers, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Provide manufacturer's certification of tower cooling capacity, based on factory-performance tests, and provide performance curve plotting Leaving-Water Temperature (LWT) against Wet-Bulb Temperature (WBT). All towers shall be tested and certified in compliance with the Cooling Technology Institute (CTI) standard 201.
- C. Certify tower wind resistance to withstand pressure indicated, in any direction. Certify earthquake resistance against loading as indicated.
- D. UL and NEMA Compliance: Provide electric motors and electrical components required as part of factory-fabricated cooling towers, which have been listed and labeled by UL and comply with NEMA Standards.
- E. The Owner, in accordance with the latest requirements of CTI Bulletin ATC-105, may perform a performance field test of the tower. Should the equipment fail to meet the specified performance guarantee, the Vendor shall, without cost to the Owner, add such additional cooling tower or fan equipment and/or make other modifications as required to enable the tower to meet the guaranteed performance. Any necessary modifications to the tower shall be accomplished during a time frame determined by the Owner that will minimize the impact upon the cooling system operations.

1.3 SUBMITTALS

- A. Submit manufacturer's technical product data, including rated capacities; pressure drop, fan performance data (including a fan curve showing brake horse power, static pressure, and fan efficiency), weights (shipping, installed, and operating), installation and start-up instructions, and rating curves with selected points clearly indicated. Submit shop

drawings indicating dimensions, required clearances, and methods of assembly of all components.

- B. Submit manufacturer's electrical requirements for power supply wiring to cooling towers. Submit manufacturer's wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- C. Manufacturer shall provide a recommended spare parts list, including current costs.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide factory-fabricated cooling towers of one of the following:
 - 1. Baltimore Aircoil Co.
 - 2. Evapco, Inc.
 - 3. Marley Cooling Tower Company

2.2 CROSS FLOW & COUNTER FLOW COOLING TOWERS

- A. Fabricate cooling towers using manufacturer's standard design, materials, and construction in accordance with published product information, except as otherwise indicated.
- B. Design structural system for a minimum of 50 psf live load and 21 psf wind load in addition to tower dead-loads and operating-loads.
- C. Fabricate structural system, including assembly of collecting basin and steel casings, via bolt connections with stainless steel fasteners. Seal joints to make watertight enclosure.
- D. Casings shall be galvanized steel.
- E. Collecting basin and sump shall be 316 stainless steel or FRP.
- F. Fill material shall be chevron shape, easily removable and fabricated of minimum 15 mil thick polyvinyl chloride plastic (PVC) capable of withstanding 130°F condenser water.
- G. Drift eliminators shall be easily removable and be fabricated of polyvinyl chloride plastic (PVC).
- H. Cross flow cooling towers shall be equipped with fiberglass reinforced plastic (FRP) louvers.
- I. Water distribution systems:
 - 1. Cross flow cooling tower water distribution system shall be factory installed schedule 40 PVC header, open basin, gravity-flow type with PVC nozzles. Manufacturer to ensure even distribution of water over wetted-surface-fill.

2. Counter flow cooling tower water distribution system shall have schedule 40 PVC pipe header and removable schedule 40 PVC pipe branches and polypropylene nozzles.
- J. Basin covers shall be galvanized steel sheet.
- K. Where cooling towers are to operate all year, provide in a weatherproof enclosure electric immersion basin heaters including thermostat and low-water cutout. Basin heaters shall be sized by the manufacturer to maintain basin water at 40°F at ambient temperature of -20°F.
- L. Provide OSHA approved galvanized steel or aluminum pipe rails above tower, including a ladder with safety cage.
- M. Water level control shall be a bronze mechanical float with adjustable linkage.
- N. Fans and drives:
1. Cross flow cooling towers shall be equipped with aluminum alloy propeller fan of fixed-pitch type. The fan assembly shall be statically balanced, and the tip speed shall not exceed 12,000 fpm. Fan & shaft shall be supported by heavy-duty grease packed ball bearings designed for a minimum L10 life of 40,000 hours. Fan and motor sheave shall be fabricated from cast aluminum.
 2. Counter flow cooling towers shall be equipped with dynamically balanced forward curved centrifugal fans with galvanized steel blades and V-belt drive with sheave sized for rated air flow. Provide inlet rings for smooth air flow and energy efficiency. Fan shall be supported by a corrosion resistant steel shaft with heavy duty relubricatable bearings.
- O. Provide totally enclosed, fan-cooled type motor as specified in DC Standards, "ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT". All motors shall be capable of operating with a variable frequency drive.
- P. Cooling tower noise level shall be determined as follows: The equivalent "A" weighted sound level, measured at 5 feet elevation above ground level and horizontally 300 feet from the louver face of the tower furnished under these specifications expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 DBA with the cooling tower operating at full load.
- Q. Provide vibration isolators as described in DC Standard, 'SEISMIC RESTRAINT & VIBRATION CONTROL.'

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which cooling towers are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION

- A. Mount unit on vibration isolators. Install gaskets or sealants between cooling tower cells. Level units to tolerance of 1/8" in 10'-0", in both directions.
- B. Provide flanged or union connections for condenser water and make-up water piping to cooling tower, with flexible pipe connections. Pitch lines so water will drain into sump. Connect make up water to automatic fill valve.
- C. Provide isolation valves for all connections to the cooling tower located such that the tower may be replaced with minimal disruption to the piping system.
- D. Connect drain, overflow, and bleed lines serving cooling towers to sanitary drain.

3.3 ADJUSTING AND CLEANING

- A. Clean inside of cooling tower thoroughly before filling for start-up. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- B. Comply with manufacturer's instructions for filling and start-up of operation, but not less than the following:
 - 1. Verify lubrication of rotating parts; lubricate as needed.
 - 2. Verify fan rotation direction.
 - 3. Verify that motor amperage is in accordance with manufacturer's data.
 - 4. Balance condenser water flow to each tower, and to each inlet for multiple inlet towers.
 - 5. Adjust water level control for proper operating level.
 - 6. Adjust bleed valve for indicated percentage of circulated water volume.

3.4 SPARE PARTS

- A. Furnish to Owner, with receipt, the following spare parts:
 - 1. One spare set of matched fan belts for each belt driven fan.
 - 2. Three spare spray nozzles for each tower cell.
 - 3. One spare gasket for each gasketed access and inspection opening.
 - 4. One valve seat for mechanical water make-up valve.

END OF SECTION 15710