

SECTION 15770

ATMOSPHERIC COOLING EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. DESCRIPTION OF EQUIPMENT

1. Provide labor, materials and equipment necessary to furnish the indicated cooling tower, including accessories as required for a complete, properly functioning, installation.
2. Provide work specified herein per governing ordinances, codes, laws and regulations.
3. Cooling towers shall be FM approved.

B. Related Work Specified Under Other Sections

1. General Mechanical Requirement - SECTION 15050.
2. Aboveground Piping Systems - SECTION 15105.
3. Electrical Work - 16000 Series SECTIONS

1.2 QUALITY ASSURANCE

A. Requirements Of Regulatory Agencies

1. Materials and equipment shall be provided and work shall be executed, tested and inspected per applicable provisions of Federal, State and Local Government laws and ordinances and referenced codes and standards. Governing laws, ordinances, codes and standards constitute minimum requirements and strict compliance therewith is required, except more stringent requirements of the CONTRACT DOCUMENTS shall modify, supplement and supersede applicable portions of governing laws, ordinances, codes and standards.

B. Design Criteria

1. Motor nameplate horsepower shall exceed the required brake horsepower at any point on the fan curve at maximum pitch.

1.3 SUBMITTALS

A. Shop Drawings And Product Data, Etc.

1. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. Additional submittal requirements pertaining to this SECTION are specified herein under this Article.
2. Furnish the following drawings:
 - a. Plan and elevation views showing dimensions and details required for interfacing, installation, including anchor bolt locations and total weight of unit for each atmospheric cooling system assembly.

- b. Selected views as required to describe accessories and show required connections and dimensions.
 - c. Electrical system and instrumentation connections.
 - d. Piping system connections.
 - e. Fan performance curves.
3. Submit pertinent data on CTI Inquiry and Bid Form Standard 181-1 through 181-4 or the manufacturer's equivalent form. In addition to fan performance curves and the following required information, include supplemental verification of proposed component or construction compliance with the CONTRACT DOCUMENTS:
- a. Brake horsepower required for maximum fan pitch setting BHP/ degrees
 - b. Fan pitch setting for project cap. conditions degrees
 - c. Fan first critical speed RPM
 - d. Fan deck live load PSF max.
 - e. Tower weight
 - 1) dry lb.
 - 2) flooded lb.
4. Include equipment and system characteristics and performance, sizes, calculations coefficients used, catalogue data and other data necessary to verify compliance CONTRACT DOCUMENTS.
5. *Test Reports [T]*: Submit performance data.

1.4 RECORD DOCUMENTS

- A. Submit as-built drawings and progress points per SECTION 01720.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit, per SECTION 01730, operating and maintenance data, special tools and spare parts list.

1.6 DELIVERY OF MATERIALS

- A. Upon completion, assembly, and testing by the manufacturer of the equipment specified, if it is found necessary for shipping and/or installation purposes to disassemble, parts shall be match-marked to facilitate erection in the field. Units shall be braced and packed for shipping to prevent breakage or distortion while in transit.
- B. Crates, boxes, and cartons shall be clearly marked to identify the equipment. Shipping invoices shall show the crate, box, or carton identification number.

PART 2 PRODUCTS

2.1 INDUCED DRAFT, CROSSFLOW COOLING TOWER

A. General

1. *Induced draft, crossflow cooling tower [D]*: Induced mechanical draft, vertical discharge, cross-flow, factory assembled cooling tower, constructed of noncombustible materials throughout. Cooling tower performance shall be tested and certified in accordance with CTI Standard 201. Each cooling tower cell shall cool 3,750 gpm from 100°F to 90°F under extreme wet bulb temperatures up to 84.5°F.
 - a. Baltimore Aircoil Co., Series 3000
 - b. Marley, NC Series

B. Construction

1. Design structure of predrilled, through-bolted, steel members with diagonal bracing, and horizontal ties in both directions. Design columns, stringers, bracing, accessory supports and mechanical connections to withstand maximum stresses imposed. Design and construct steel members per AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings and the AISI Light Gage Cold Formed Steel Structural Members.
 - a. Manufacturer's standard completely enclosed gravity type hot water distribution system.
 - b. Provide an FM approved noncombustible inorganic honeycomb fill, with louvers formed as part of each fill sheet, fabricated of minimum 3/4-inch honeycomb construction polyvinyl chloride (PVC) impervious to rot, decay, fungus or biological attack and have a flame spread rating of 5 or less per ASTM E84-77a. Material shall be structurally stable under loads imposed over the service temperature range, including thermal shock and icing. Continuously support fill, and replace cracked or otherwise damaged fill. Construct fill in units providing removal for inspection, cleaning, or replacement.
 - c. Provide eliminators formed from polyvinyl chloride (PVC), impervious to rot, decay fungus or biological attack and have a flame spread rating of 5 or less per ASTM E84-77a. Assemble eliminators in removable racks. Eliminators shall limit drift loss to less than 0.005% of the design circulating flow rate.
 - d. Provide casing constructed with galvanized steel panels. Tower shall be suitable for applications requiring anchorage up to wind loads of 30 psf.
 - e. Furnish a factory fabricated, welded, rigid basin structure of not less than 12 gage AISI Series 300 stainless steel with overflow provisions, screen and outlet location as noted on the drawings. Where multiple cells are shown to be located adjacent to each other, provide connections for direct inter-connection of tower basins. Design and construct basin to accommodate loads of indicated support elements.
 - f. Furnish fan stacks of manufacturer's standard corrosion resistant material and fit with screens.
 - g. Hot water distribution system: Manufacturer's standard completely enclosed spray nozzle or serrated edge trough type. Nozzles: Mechanically attached nonclogging nonferrous metal. Hot water distribution basin shall be constructed of heavy gage dot-dip galvanized steel.

2. *Fans [D]*: Furnish airfoil twisted taper adjustable pitch blades, constructed of solid aluminum alloy. Corrosion protect hub and furnish with anti-recirculation hub cover. Statically and dynamically balance fan at the factory. Fan performance curves shall accompany shop drawing submittal.
3. *Gear Reducer [D]*: Provide close-coupled motor to gear reducer.
4. *Motor [D,P]*: Per SECTION 15010 shall be premium efficiency, totally enclosed fan cooled with 120 volts AC resistance heaters and enclosure drain, suitable for use with variable frequency drive per NEMA MG1, Part 31, Definite Purpose Inverter-Fed Motors. At time of acceptance tests, perform motor horsepower measurement with calibrated wattmeter or power analyzer furnished by the CONTRACTOR. Motor nameplate horsepower shall exceed brake horsepower required at any point on the fan curve at maximum pitch.
5. *Vibration [D]*: Vibration switch shall shut off power to driver in case of excessive vibration in gear and fan assembly. Switch shall be manufacturer's standard, manually resettable type.
6. *Sound level*: The sound pressure level with unit in full operation shall not exceed 80 dBA measured at any point 50 feet from the major surfaces of the cooling tower at a height of 3 to 5 feet above the supporting surface.
7. *Access provisions*: Design and construct cooling tower to provide access for maintenance servicing and repair. This requirement includes inspection plates and panels, access doors, ladders, landings or platforms, catwalks and similar devices. Tower safety provisions for openings, railings, platforms and ladders per ANSI A12.1. Provide heavy-duty metal guards or enclosures per ANSI B15.1. Provide steel pipe perimeter hand rail and knee rail on fan deck of tower. Provide OSHA compliant steel ladder, man-access doors, and walkways to tower interior.
8. *Hardware*: Regular bolting, anchor bolting, weldments, and fasteners shall be of AISI 300 series stainless steel.
9. *Corrosion protection*: Hot-dip or mill galvanize ferrous materials used in the construction of any portion of the cooling tower or supporting member. Design and fabricate components to preclude field drilling or cutting during assembly. Fabricate hot-dip galvanized materials per ASTM A 384, ASTM A 385, and ASTM A525 with coating Designation G-165 or G-90 plus an approved proprietary corrosion protective coating. Gray iron castings shall be heat treated if used. Solvent clean or vapor degrease zinc-coated steel surfaces to be painted or coated to remove grease, oil, dirt, and other foreign matter. Field repair damaged galvanized surfaces with inorganic zinc rich coating.
 - a. Amerion "EZ".
 - b. Ceilcote.
 - c. Carboline.

2.2 COOLING TOWER REMOTE BASIN HEATER

- A. *Over the side basin heater [D]*: One controller shall control two heaters. Each heater shall be 7'-0" long and 8kW. Set point shall be 45F. Provide UL listed, AISI Type 304 stainless steel, welded construction, over the side electric immersion heaters as indicated with liquid proof NEMA 4 outlet box, reinforced riser, extension arm, 250°C rated high temperature lead wire, low water cutout probe, and large diameter heating elements. Unit shall be rated for 250°F operating temperature. Furnish units complete with UL listed control panel housed in NEMA 4X enclosure with 23 feet of direct immersion rated cord, probe set transformer, printed circuit

board, and 50 amp, 3 pole, contactor. Units shall accept a single 480v, 3ph, 60HZ power feed as part of Div. 16 Series Sections Work.

1. INDEECO, Model 762U heater with Model 874Z-Series control panel.
2. Other approved.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. CHECK, TEST AND START-UP

1. Provide all labor and materials for equipment check out and testing by a factory trained and authorized representative of the cooling tower manufacturer prior to starting the machine. Upon successful check out and testing, tower shall be started under the supervision of the manufacturer's field representative. The report of check, test and start-up shall be documented and certified in writing on the manufacturer's standard forms.

B. INSTALLATION AND RUN-IN

1. Installation and related work will be performed under the direction of an authorized representative of the manufacturer.
2. Start-up and run-in shall be performed under the direction of an authorized representative of the manufacturer who shall inspect, make critical adjustments of equipment and calibration of controls, to verify a complete, properly functioning installation.

C. TEST

1. Should the OWNER request testing to determine compliance with performance requirements, the costs of testing shall be borne by:
 - a. The OWNER, if compliance is demonstrated by the tests.
 - b. The Manufacturer, if testing indicates failure to fully comply with performance requirements of the CONTRACT DOCUMENTS.
2. The test procedures of ASME Power Test Code PTC 23 11 be used in determining compliance with the CONTRACT DOCUMENTS performance requirements. If testing or retesting of the cooling tower furnished under this CONTRACT indicates failure to meet the performance requirements of the CONTRACT DOCUMENTS, the Manufacturer shall be responsible for whatever additions, modifications or replacements necessary to provide the OWNER with a cooling tower which conforms to these performance requirements. Schedule repair work at a time convenient to the facility being served.

END OF SECTION

Revision History	
Date	Rev. No.
A	0
B	0
C	0
D	0
E	0
F	0
02-19-09	0

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