

**SECTION 23 65 00
COOLING TOWERS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes modular, factory assembled and tested, open circuit mechanical induced-draft vertical discharge cooling tower.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, pressure drop, performance curves with selected points indicated, furnished specialties, and accessories.

B. Shop Drawings: Complete set of manufacturer's prints of equipment assemblies, control panels, sections and elevations, and unit isolation. Include the following:

1. Assembled unit dimensions.
2. Weight and load distribution.
3. Required clearances for maintenance and operation.
4. Sizes and locations of piping and wiring connections.
5. Wiring Diagrams: For power, signal, and control wiring. Differentiate between manufacturer installed and field installed wiring.

C. Operation and Maintenance Data: Each unit to include operation and maintenance manual.

1.4 QUALITY ASSURANCE

A. Verification of Performance:

1. The thermal performance shall be certified by the Cooling Technology Institute in accordance with CTI Certification Standard STD-201. Lacking such certification, a field

acceptance test shall be conducted within the warranty period in accordance with CTI Acceptance Test Code ATC-105, by a Licensed CTI Thermal Testing Agency.

2. Unit Sound Performance ratings shall be tested according to CTI ATC-128 standard. Sound ratings shall not exceed specified ratings.

3. Unit shall meet or exceed energy efficiency per ASHRAE 90.1-2019.

1.5 WARRANTY

A. Submit a written warranty executed by the manufacturer, agreeing to repair or replace components of the unit that fail in materials and workmanship within the specified warranty period.

1. The Entire Unit shall have a comprehensive one (1) year warranty against defects in materials and workmanship from startup, not to exceed eighteen (18) month from shipment of the unit.

2. Fan Motor/Drive System: Warranty Period shall be Five (5) years from date of unit shipment from Factory (fan motor(s), fan(s), fan shaft(s), bearings, mechanical support, sheaves, bushings and belt(s)).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cooling towers manufactured by one of the following:

1. EVAPCO Model _____

2. Approved Substitute

2.2 THERMAL PERFORMANCE

A. Each unit shall be capable to cool ____ GPM of water entering at ____° F leaving at ____° F at a design entering wet bulb of ____° F.

2.3 COMPONENTS

A. Description: Modular, factory assembled and tested, induced draft counter flow cooling tower complete with fan, fill, louvers, accessories and rigging supports

1. The complete cooling tower and accessories shall consist of modules, completely pre-assembled in the factory, requiring minimal field assembly.

B. Materials of Construction

1. All cold water basin components including vertical supports, air inlet louver frames and panels up to rigging seam shall be constructed of heavy gauge mill hot-dip galvanized steel.

2. Upper Casing, channels and angle supports shall be constructed of heavy gauge mill hot-dip galvanized steel. Fan cowl shall be constructed of fiberglass. All galvanized steel shall be coated with a minimum of 2.35 ounces of zinc per square foot of area (G-235 Hot-Dip Galvanized Steel designation). During fabrication, all galvanized steel panel edges shall be coated with a 95% pure zinc-rich compound.

*All evaporative cooling equipment utilizing galvanized construction require initial passivation to maximize the service life of the equipment. The site's water treatment vendor should be contacted several weeks prior to adding any water to the system to provide a passivation plan along with associated passivation plan costs.

C. Mechanical Equipment Support

1. The mechanical equipment support shall be a one-piece torque-tube type welded steel assembly, hot-dip galvanized, and designed to maintain alignment of rotating parts during start-up, shut down, high vibration trip and all operating conditions.

D. Fan(s):

1. Fan(s) shall be high efficiency axial propeller type with aluminum wide chord blade construction. Each fan shall be dynamically balanced and installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.

E. Drift Eliminators

1. Drift eliminators shall be constructed entirely of Polyvinyl Chloride (PVC) in easily handled sections. Design shall incorporate three changes in air direction and limit the water carryover to a maximum of 0.001% of the recirculating water rate. Drift eliminators shall be self-extinguishing, have a flame spread of less than 25 under ASTM E84, and shall be resistant to rot, decay and biological attack.

F. Water Distribution System

1. Spray nozzles shall be precision molded ABS, large orifice nozzles utilizing fluidic technology for superior water distribution over the fill media. Nozzles shall be designed to minimize water distribution system maintenance. Spray header and branches shall be Schedule 40 Polyvinyl Chloride (PVC) for corrosion resistance with a steel connection to attach external piping.

G. Heat Transfer Media

1. Fill media shall be constructed of Polyvinyl Chloride (PVC) of cross-fluted design and suitable for inlet water temperatures up to 130° F. The bonded block fill shall be bottom supported and suitable as an internal working platform. Fill shall be self-extinguishing, have a flame spread of less than 25 under ASTM E84, and shall be resistant to rot, decay and biological attack.

H. Air Inlet Louvers

1. The air inlet louvers shall be constructed from UV inhibited Polyvinyl Chloride (PVC) and incorporate a framed interlocking design that allows for easy removal of air inlet louvers for access to the entire basin area for maintenance. The air inlet louvers shall have a minimum of two changes in air direction and shall be of a non-planar design to prevent splash-out and block direct sunlight & debris from entering the basin. Air inlet louvers shall be self-extinguishing, have a flame spread of less than 25 under ASTM E84, and shall be resistant to rot, decay and biological attack.

I. Make up Float Valve Assembly

1. Make up float assembly shall be a mechanical brass valve with an adjustable plastic float.

J. Pan Strainer

1. Pan Strainer(s) shall be all Type 304 Stainless Steel construction with large area removable perforated screens.

K. Pipe Connection Type

1. Any connections provided with a Groove (GVD) or Beveled for Welding/Grooved (BFW/GVD) shall conform to standard groove specification (SGS).

2.4 MOTORS AND DRIVES

A. General requirements for motors are specified in Division 23 Section "Motors"

B. Fan Motor

1. Fan motor(s) shall be totally enclosed, ball bearing type electric motor(s) suitable for moist air service. Motor(s) are Premium Efficient, Class F insulated, 1.15 service factor design. Inverter rated per NEMA MG1 Part 31.4.4.2 and suitable for variable torque applications and constant torque speed range with properly sized and adjusted variable frequency drives.
2. Fan motor(s) shall include strip-type space heaters with separate leads brought to the motor conduit box.

C. Fan Drive

1. Fan(s) shall be driven through a right angle, industrial duty, oil lubricated, geared speed reducer. Gear drive shall be internally mounted and connected to the fan motor via a drive-shaft coupling. Motor and gear shall be connected by a composite drive shaft with two stainless steel flexible couplings and shall be designed to accept axial and angular motion. Couplings shall be selected for a 2.0 service factor. Fan motor shall be located outside the airstream. Floating drive shaft shall be shipped loose for field mounting and alignment by others.

2.5 MAINTENANCE ACCESS

A. Fan Section

1. Access door shall be hinged and located in the fan section for fan drive and water distribution system access. Swing away motor cover shall be hinged for motor access.

B. Basin Section

1. Framed removable louver panels shall be on all four (4) sides of the unit for pan and sump access.

C. Internal Working Platform

1. Internal working platform shall provide easy access to the fans, motors, gear drives, all mechanical equipment and complete water distribution system. The cooling tower fill shall be an acceptable means of accessing these components.

2.6 ACCESSORIES

A. Piping Connections

1. The cooling tower outlet shall be provided with a field installed depressed sump box capable of fitting a Class 150# flange.
2. Cooling tower shall be provided with a single bottom inlet connection with internal piping. Single inlet configuration shall be designed to act as a balancing chamber.