

**SECTION 23 6533**  
**LIQUID COOLERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Liquid cooler.
- B. Controls.
- C. Inside sump.
- D. Circulating pump.
- E. Sound attenuators.
- F. Discharge hood.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 0513 - Common Motor Requirements for Plumbing Equipment.
- B. Section 22 1005 - Plumbing Piping.
- C. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- D. Section 23 0548 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- E. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- F. Section 23 0719 - HVAC Piping Insulation.
- G. Section 23 2113 - Hydronic Piping.
- H. Section 23 2123 - Hydronic Pumps.
- I. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 1990 (Reapproved 2008).
- C. ASME PTC 23 - Atmospheric Water Cooling Equipment; 2003.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, dimensions, weights and point loadings, accessories, required clearances, electrical requirements and wiring diagrams, and location and size of field connections. Submit schematic indicating capacity controls.
- C. Shop Drawings: Indicate suggested structural steel supports including dimensions, sizes, and locations for mounting bolt holes.
- D. Certificates: Certify that liquid cooler performance, based on ASME PTC 23 meet or exceed specified requirements and submit performance curve plotting leaving water temperature against wet bulb temperature.
- E. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F. Operation and Maintenance Data: Include start-up instructions, maintenance data, parts lists, controls, and accessories. Include cleaning methods and cleaning materials recommended.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Factory assemble entire unit. For shipping, disassemble into as large as practical sub-assemblies so that minimum amount of field work is required for re-assembly.
- B. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

### **1.07 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for liquid cooler package, labor.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURED UNITS**

- A. Provide outdoor units, factory assembled, sectional, counterflow, vertical discharge, forced draft design, with fan assemblies built into pan and casing.

### **2.02 COMPONENTS**

- A. Pan and Casing: Galvanized steel, 12 gage, 0.1046 inch for casing and 8 gage, 0.1644 inch for reinforcing angles and channels.
  - 1. Access doors at both ends of cooler to air plenum.
  - 2. Lift out steel strainer.
  - 3. Inlet and outlet silencers.
  - 4. Discharge hood with access doors.
  - 5. Duct flanges on inlet and outlet.
- B. Cooler Coil: Steel tubing, air tested under water to 350 psi, sloped to ensure drainage, encased in steel framework. Provide cleanable header unit with removable cover plates on header to access tubular coil.
- C. Fans: Multi blade, cast aluminum, axial type, with belt drive, bearings with ABMA STD 9 or ABMA STD 11, L-10 life expectancy at 30,000 hours, with extended grease fittings.
- D. Fan Motors: Single speed (1800/900 rpm) mounted on adjustable steel base. Refer to Section 23 0513.
- E. Distribution Section: Polyvinyl chloride piping header and branches with ABS plastic spray nozzles.
- F. Drift Eliminators: Two or three pass formed steel, minimum 24 gage, 0.0239 inch, to limit drift loss to 0.7 percent of total water circulated.
- G. Galvanized Steel Sheet Components: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G210/Z600 coating.
- H. Steel Angles, Plates, Bars, and Shapes: Galvanized after fabrication in accordance with ASTM A123/A123M, Coating Thickness Grade 100.
- I. Finish: Electrostatically sprayed thermosetting polymer.
- J. Hardware: Galvanized steel.

### **2.03 INSIDE SUMP**

- A. Pan and Casing: Galvanized steel, 12 gage, 0.1046 inch for casing and 8 gage, 0.1644 inch for reinforcing angles and channels with lift out steel strainer.

- B. Finish: Electrostatically sprayed thermosetting polymer.

#### **2.04 CIRCULATING PUMP**

- A. Pump: Close coupled, bronze fitted, centrifugal pump with mechanical seal, mounted on piping.
- B. Pump Control: Pan mounted immersion thermostat set at 140 degrees F.
- C. Pump motor: Single speed (1800/900 rpm) open drip proof mounted on pump body. Refer to Section 22 0513.

#### **2.05 ACCESSORIES**

- A. Electric Immersion Heaters: In pan suitable to maintain temperature of water in basin at 42 degrees F when outside temperature is 0 degrees F and wind velocity is 15 mph; immersion thermostat and float control to operate heaters on low temperature when pan is filled.
- B. Electric Temperature Controller: In pan, set at 140 degrees F; with sensor to cycle fans.
- C. Time Delay Relay: Limits fan motor starts to not more than six per hour.
- D. Capacity Control: Scroll damper and modulating electronic damper motor controlled by temperature controller; sensor in pan set at 140 degrees F.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that openings are ready to receive work.
- B. Verify field measurements are as shown on drawings.
- C. Verify that required utilities are available, in proper location, and ready to use.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install cooler on structural steel beams as instructed by manufacturer.
- C. Connect cooler water piping with flanged connections to cooler. Refer to Section 23 2113.
- D. Connect make-up water piping with flanged or union connections to cooler. Pitch to cooler. Pipe drain, overflow drain, and bleed lint to nearest floor drain. Refer to Section 22 1005.

#### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Provide the services of the manufacturer's field representative to inspect tower after installation and submit report prior to start-up, verifying installation is in accordance with specifications and manufacturer's recommendations.

#### **3.04 SYSTEM STARTUP**

- A. Prepare and start systems.
- B. Allow 2 eight hour days per cooler for start-up and instructions of Owner's operating personnel.

#### **3.05 ADJUSTING**

- A. Adjust water level float valves and float controls for proper operating level.
- B. Adjust bleed valve for proportion of circulated water.
- C. Adjust temperature controls and verify operation.

**END OF SECTION 23 6533**

