**15XXX- Field****-Assembled or Factory-Assembled Cooling Tower**

**PART I-GENERAL**

1. General

1.0 Provide a \_\_\_cell(s) counter-flow induced-draft type cooling tower, conforming to all specifications, schedules and as shown on the plans. The tower shall be capable of cooling \_\_\_\_\_\_\_ gpm of water from \_\_\_°F to \_\_\_°F with a \_\_\_°F ambient air wet bulb temperature. Deviations from the design conditions in any respect are not acceptable. The tower shall not exceed the limiting dimensions of \_\_\_\_inches long x \_\_\_ inches wide x \_\_\_\_ inches high (not including the concrete foundations). The total connected horsepower of the tower fans shall not exceed \_\_\_ HP (nominal motor nameplate horsepower) or \_\_\_ HP per motor. The tower shall be equal to MESAN Model MCC-\_\_-\_ or approved equal. Alternate cooling towers shall include whatever costs required for alterations to the electrical system, architectural enclosures, concrete foundations or structural steel required for different tower configurations or sizes.

1.1 The cooling tower performance shall be certified by the Cooling Tower Institute in accordance with CTI STD-201. Alternate towers that are not certified by CTI shall include in their bid a cost allowance for a third party certification test to be performed during the warranty period, as per CTI ATC-105. Manufacturer’s performance warranty alone shall not be accepted. Manufacturer shall have CTI-certified product lines for at least 10 years

1.2 The cooling tower manufacturer shall have a Quality Management System certified by an accredited institution as complying with the requirements of ISO-9001 – 2008, in order to ensure consistent quality of its products and services. Cooling tower manufacturers that are not ISO-9001 certified shall not be accepted.

1.3 Cooling tower manufacturer shall provide comprehensive field-assembly instructions in video format, in addition to written instructions. Written instructions alone shall not be accepted.

**PART II- PRODUCTS**

**2.1 Tower Structure**

2.1.1 The construction of the cooling tower(s) shall be of HDF (High-Density Fiberglass) 6 mm minimum thickness, with smooth surfaces inside and out (Hand-laid FRP shall not be accepted) with UV-resistant white gelcoat and structure made of heavy gauge hot dip galvanized steel (*alternatively SS-304 or SS-316, please indicate*).

2.1.2 The cold water basin shall be constructed of HDF (High-Density Fiberglass) 6 mm minimum thickness, with smooth surfaces on both sides, and upported by heavy gauge hot dip galvanized structure (*alternatively SS304 or SS316, please indicate)*. The basin sections shall be sloped toward the sump tank to ease cleaning. Cold water basin shall be fitted with ANSI-125 flanges (3” diameter and above) for field piping connections (*SS304 flanges also available as an alternative*), DN type flanges are also accepted. A brass float valve with stainless steel float shall be provided (*optional Electronic Water Level Controller in lieu of float valve, please indicate)*. Make-up and overflow piping connections shall be threaded type (NPT or B.S. threads are acceptable)

2.1.3 Hot water distribution system. Water shall be distributed evenly over the fill by a water distribution system consisting of a PVC header and PVC spray branches with static-type distribution nozzles made of nylon, rotary nozzles shall not be accepted. ANSI-125 flanges shall be provided as water inlet (DN type flanges also accepted).

2.1.4 Fill shall be counter flow film type, rated for temperatures up to 45°C, The fill shall be suitable for use as a working platform. *(Higher temperature and/or ASTM infill also available as an option, choose one)*

2.1.5 Drift eliminators with at least three changes of direction made of PVC shall limit drift losses to 0.005% or less of the design water flow rate.

2.1.6 The fan deck and fan cylinder shall be FRP with UV-resistant gelcoat. The fan deck shall be designed to withstand a 50 psf live load or a 200 pound concentrated load. The top of the fan cylinder shall be equipped with an OSHA-compliant, removable fan guard made of hot dip galvanized steel (*SS-304 or SS-316 also available, choose one*) with openings not larger than 1.25” x 1.25”.

2.1.7 Air intake louvers shall be designed to prevent sunlight from hitting the water inside the basin (sight-proof type). Louvers shall be made of PVC *(optional HDGS, SS304 or SS316 louvers)*

**2.2 Mechanical Equipment**

2.2.1 Fan shall be axial type with airfoil type blades made of extruded aluminum with adjustable pitch *(Silent-Choice® wide-chord blade fans are also available as a super low noise option)*. Standard fan blades shall be 14” (355 mm) wide minimum (chord length) and fitted with aerodynamic blade end tips designed to prevent air spillage between blade end and fan cylinder, and increase fan efficiency. Direct-driven fans shall not be accepted

2.2.2 Fan hub to be made of a single billet steel piece and CNC-machined to integrate the blade shafts cradles, with conical shaft hole (tapered lock type) to ensure perfect centering of the complete assembly. Fan hubs with welded or bolted-on cradles shall not be accepted. Aluminum fan hubs shall not be accepted. Fan hubs using set screws to attach to the fan shaft shall not be accepted *(Silent-Choice® fans may use different hub design and materials)*

2.2.3 Fan motor(s) shall be totally-enclosed, air-over (TEAO), reversible, ball bearing type, designed specifically for cooling tower service. The motor shall be furnished with special moisture protection on winding, shafts and bearings, shall comply with IP55 enclosure and insulation class F standard. Maximum motor size shall not exceed \_\_ HP per cell.

2.2.4 The fan(s), fan shaft(s), bearings, speed reducer and fan motor shall be warranted against defects in materials and workmanship for a period of five 18 months from date of shipment, or 12 months from commissioning date, whichever comes first. Warranty replacements are FOB point of delivery of original order *(an optional 5-year warranty is available for all moving parts, except belts)*

2.2.5 The fan drive shall be V-belt type with tapered lock pulleys, and multiple belts sized for 150% of the motor nameplate HP rating (*Amarillo or Sumitomo gear reducers also available, please indicate)* The belts material shall be neoprene reinforced with polyester cord and specifically designed for cooling tower service, single belts (a.k.a. “powerband”) shall not be accepted. Fan sheaves(s) shall be cast iron construction with corrosion protective coating. Aluminum pulleys shall not be accepted. The fan and fan pulleys shall be mounted on the shaft with special tapered bushing to provide maximum torque and centering and prevent wobbling. Pulley assemblies using set screws shall not be accepted.

2.2.6 Bearings. There shall be a minimum of three (3) bearings per fan: 2 radial and 1 axial bearing. Bearings must be rated for L10, 80,000 hours of service life, sealed type, permanently lubricated and enclosed inside a steel cylinder with bolted on caps to isolate them from the airstream. Pillow-block bearings shall not be accepted. Bearings requiring preriodic lubrication shall not be accepted. Bearings exposed to the airstream, shall not be accepted

2.2.7 For towers equipped with gear drives (*optional)*, the motor, drive and transmission shaft shall be factory assembled and laser aligned and shipped as a single piece. Disassembled drives requiring field alignment and field assembly shall not be accepted.

**2.3 Water Outlet**

2.3.1 The cooling tower basin shall be provided with an ANSI-125 flanged connection (DN flanges are also accepted) on the side of the cold water basin’s water sump box. The outlet shall be provided with large area removable FRP strainer and an anti vortex device to prevent air entrainment. The strainer shall match the materials of construction of the cold water basin. Tower manufacturers that do not supply integral strainers in their cold water basins shall include in their pricing an additional full flow basket strainer to be installed in the condenser water piping.

2.3.2. For multiple-cell applications, an equalizing pipe connection shall be provided for each tower, installed on one side of the water sump, fitted with ANSI-125 flange (DN flanges also accepted) and with the same diameter as the outlet pipe connection. Flume boxes shall not be accepted

**2.4** **Access and maintenance**. To extend the lifespan of the tower by easing the accessibility and maintenance of the tower the following must be provided and shall not be excluded by any cooling tower manufacturer. Exclusions to this section shall not be considered as equal.

2.4.1 An OSHA-compliant access ladder made of hot dip galvanized steel (*SS-304 or SS-316 also available)* shall be provided for access to the fan deck.

**2.5 Cooling Tower Accessories**

2.5.1 (Optional) **Handrail**: A hot dip galvanized steel (*SS-304 or SS-316 also available)* handrail shall be provided around the perimeter of the service platform or fan deck. The handrails shall be provided with knee and toe rails. All components shall comply with OSHA standards.

2.5.2 (Optional) **Ladder Safety Cage:** A heavy gauge galvanized steel safety cage shall be equipped on the ladder which shall comply with OSHA standards.*(optional SS304 or SS316)*

2.5.3 (Optional) **Service platform**：An HDGS service platform shall be extended from one side of the fan deck, platform surfaces shall be designed to withstand 50 psf or 200 lbs live load, a handrail shall be provided around the service platform *(optional SS304 or SS316)*.

2.5.4 (Optional) **Vibration Cut-off Switch**: Provide electronic vibration switch with contact for BAS monitoring. Wiring shall be by the installing contractor. The electronic vibration cut-off switch shall trip at a point such point shall be 0.6 in/sec.

2.5.5 (Optional )**Stainless steel hardware**: including bolts, nuts, washers, hinges and safety cage and handrail shall be offered either SS304 or SS316 (*choose one*) stainless steel.

2.5.6f Standard Warranty shall cover manufacturing defects for a period of 10 years from invoice date on all fiberglass components. For other components the warranty is12 months from start-up date, or 18 months from invoice date, whichever occurs first. Warranty covers parts replacement only at same FOB point of the original order. Manufacturer reserves the right to request the return of any defective parts for analysis before validating the warranty. Any freight costs associated with returned defective parts to be covered by the customer. An exception to this policy are those moving components (motor, speed reducer, bearings and pulleys) covered by an optional extended  5-year warranty, for which the delivery point, FOB terms and freight costs coverage remain the same as for the standard warranty.

END OF SECTION