**MESAN USA MXL Series, Engineering Guide Specifications**

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

**PART I- GENERAL**

A. General

1.0 Provide an induced draft, cross flow 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 foundation). The total connected horsepower of the tower fans shall not exceed \_\_\_ HP (nominal motor nameplate horsepower). The tower shall be equal to MESAN Model MXL-\_\_-\_\_ 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 at least 10 years of experience manufacturing CTI-certified towers. Manufacturers of non-CTI certified towers which do not pass the ATC-105 field test, shall be required to modify the towers to achieve the specified performance, at no additional cost for the customer, and without altering the overall dimensions of the units as well as the motor kW consumption. Such modifications shall be completed within 30 days of the test. A second field test shall be done to verify compliance with the specifications after the towers are modified. All costs incurred for shall be covered by the cooling tower manufacturer

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-9001-2008 certified shall not be accepted.

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

1.4. Cooling towers shall be ASHRAE-90.1-2013 compliant. Non-compliant towers shall not be accepted.

**PART II- PRODUCTS**

**2.1 Tower Construction**

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. Series 300 stainless steel shall not be accepted on any components*). Tower casings made of HDGS shall use G235 (Z700) zinc coating thickness with an additional corrosion protective polymeric coating, as standard. Fiberglass components shall be covered by a 10-year warranty. Tower components shall be joined/assembled using bolts, nuts and washers. Towers assembled with self-tapping screws shall not be accepted.

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 supported by heavy-gauge hot-dipped 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 HDGS 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 The hot water distribution system shall be open gravity type, with fixed calibrated orifices and without nozzles, removable nozzles shall not be accepted. The hot water basin and basin covers shall be constructed of FRP with UV-resistant gel coat (*alternatively, HDGS, SS304 or SS316)*. The fan deck and hot water basin covers shall be designed to withstand a 50 psf live load or a 200 pound concentrated load. FRP strainers shall be provided for each hot-water basin, and fitted with anti-splash covers made of FRP *(alternatively HDGS, SS304 or SS316)*.

2.1.4 The distribution fill located underneath the hot-water basin and above the fill sheets, shall be made of vacuum formed PVC designed to ensure the even distribution of water over the wet deck surface. (*Optional, ASTM-E84 fire retardant fill and CPVC for water temperatures higher than 45°F. PP or Polypropylene fill shall not be accepted because of its high flammability)*

2.1.5 Fill shall be arranged in several staggered layers over the entire height of the air intake opening. Single height fill sheets running vertically for the whole height of the air opening shall not be accepted. Fill sheets shall have a herringbone corrugation design with built-in 45° angled air intake louvers and built-in primary drift eliminators.

Standard fill material shall be PVC film type with thickness not less than 0.27 mm or 10 mils (measured after forming) rated for temperatures up to 45oC. (*Optional, ASTM-E84 fire retardant fill and CPVC for water temperatures higher than 45°F. PP or Polypropylene fill shall not be accepted, because of its high flammability)*

2.1.6. Separate secondary drift eliminators with at least three changes of direction made of PVC and at least 5.5” thick shall be provided. Towers with only one set of drift eliminators shall not be accepted. Total drift loss shall not exceed 0.005% of nominal water flow rate.

2.1.7 The fan deck and fan cylinder shall be FRP with UV-resistant gelcoat. The top of the fan cylinder shall be equipped with a removable OSHA-compliant 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”.

**2.2 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 periodic lubrication shall not be accepted. Remote lube lines 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 (DN also acceptable) flanged connection on one 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 *alternatively SS304 or SS316)*. The strainer shall match the materials of construction of the cold water basin. Tower manufacturers which do not supply integral strainers in their cold water basins shall include in their pricing an additional full flow basket strainer to be installed externally 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 HDGS ANSI-125 flange (DN also acceptable) 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.

2.4.2. Two access doors shall be provided on opposite sides of the tower, to allow maintenance workers to get inside the tower.

2.4.3. An internal walkway, running between the two access doors shall be provided. The surface of this walkway shall be anti-skid.

2.4.4. Hot water basin covers shall be provided as standard, in order to protect the water from the UV radiation and prevent algae growth. Basin covers shall have two handles and shall be lockable to keep them in place under high wind conditions. Basin cover shall be designed for 200 lbs live load or 50 psf.

**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. Handrail shall have a self-closing gate at the point of access from the ladder.

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.

2.5.6. (Optional) **A Chemical-free water treatment system:** A water purification system consisting of a radio-frequency generating device that produces radio signals in the 140 kHz range, to control bacteria and scaling plus eradicate biofilm without the use of chemicals, shall be supplied.

2.5.7. (Optional) **Electronic water level control:** A solid-state electronic water level control system, using up to 5 water-proof electrodes to sense: High/Low level, Heater cut-off, Low alarm, including a remotely-mounted hard-wired control panel in a NEMA-3R enclosure (IP-55), with optional relays for remote alarms. System to be covered by a lifetime warranty. As part of the ELWC system, a 2-way electric solenoid valve shall be supplied to replace the standard float valve.

2.5.8. (Optional) Electric **basin heaters:**  Immersion type electric basin heaters shall be provided in kW rating as per local weather conditions.

2.5.9. (Optional) **“TowerMizer”™:** An intelligent tower control panel shall be supplied. This controller shall be designed for cooling tower operation, using Variable Frequency Drives (up to 6 drives per panel), a PLC controller, circuit breakers, digital and analog I/O board, shall have a 6” touch-screen user interface (controller with door mounted push buttons or knobs shall not be accepted). Controller shall vary the fan speed according to leaving water temperature, or scheduling (user selectable). LWT temperature immersion sensor and well to be supplied by cooling tower manufacturer as part of the TowerMizer™ package. Controller shall have BacNET communication capabilities (LonWorks also available) to connect to the building’s BMS system. All control components shall be housed in a NEMA-3R metal enclosure (with built-in cooling fan and air filter). VFDs as loose components (not as part of a complete control panel) shall not be accepted.

* (Optional): A basin heater contactor and ambient temperature sensor shall be also supplied as part of this control package.

**2.6. Warranty**

2.6.1. 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. An exception to this, are those moving components (motor, speed reducer, bearings and pulleys) covered by an optional extended  5-year warranty.

END OF SECTION