**MESAN USA series MXR-KM (sizes A1 to E3) Engineering Guide Specifications**

The following document can be provided to an Engineer, Contractor, or Owner to allow them to properly specify MESAN’s MXR-KM series Cooling Towers.

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

**PART I- GENERAL**

A. General

1.0 Provide an induced draft, cross 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). The tower shall be equal to MESAN Model MXR-KM-(A1 to E3)-\_\_-\_ 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 cost 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.

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

**PART II- PRODUCTS**

**2.1 Tower Structure**

2.1.a The construction of the cooling tower(s) shall be of hand-laid FRP (fiberglass reinforced polyester) with UV-resistant white gelcoat, The FRP casing panels shall be double-wall and self supporting, designed in a way to provide structural support to the fan deck including drive assembly, motor and hot water basins, without any steel columns inside the tower. Only metal components inside the tower (in contact with water) shall be the structural cross members, diagonal and horizontal ones. Drive assembly support brackets and cross members shall be made of Hot Dipped Galvanized Steel (HDGS) (*alternatively SS-304 or SS-316, please indicate*).

2.1.b The cold water basin shall be constructed of FRP with UV-resistant white gel coat. The basin sections underneath the fill area shall be sloped toward the center 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*) or NPT female threaded ports (2-1/2” diameter and below). A brass float valve with stainless steel float shall be provided. Make-up and overflow piping connections shall be NPT threaded type.

2.1.c 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. 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. The distribution fill shall be made of vacuum formed PVC designed to ensure the even distribution of water over the wet deck surface. Fill shall be arranged in several staggered layers over the 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 built-in 45° air intake louvers.

2.1.d Fill shall be PVC film type with thickness not less than 0.27 mm or 10 mils (measured after vacuum forming) rated for temperatures up to 45oC. (optional ASTM fire retardant fill and also high-temperature CPVC fill, please indicate)

2.1. e. Separate drift eliminators with at least three changes of direction made of PVC and at least 5.5” thick shall be provided. Integral drift eliminators as part of the fill sheets shall not be accepted.

2.1.f 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 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.g A secondary ladder shall be provided to give access to the top of the fan cylinder. Material for this ladder shall be HDGS (*SS-304 or SS-316 also available, choose one*)

**2.2 Mechanical Equipment**

2.2.a Fan shall be axial type with airfoil blades made of extruded aluminum with adjustable pitch. Fan blades made of sheet-metal shall not be accepted

2.2.b Fan hub to be made of a single billet steel piece, CNC-machined to integrate the blade shaft 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 hub shall attach to the fan shaft through a tapered-lock joint (conical). Fan hubs using set screws to attach to the fan shaft shall not be accepted

2.2.c Fan motor(s) shall be totally-enclosed, air-over (TEAO), reversible, cage, 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.(optional, motor located out of the airstream, please indicate)

2.2.d 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 (5) years from date of shipment, FOB point of delivery of original order

2.2.e The fan drive shall be V-belt type with tapered lock pulleys designed for 150% of the motor nameplate HP rating (*Amarillo or Sumitomo gear reducers also available, please indicate)* The belt material shall be neoprene reinforced with polyester cord and specifically designed for cooling tower service. 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 (tapered lock) to provide maximum torque and centering and prevent wobbling. Fan assemblies using set screws shall not be accepted. Bearings must be NSK brand or equivalent 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 bearings shall not be accepted. Bearings exposed to the airstream, shall not be accepted. Bearings requiring periodic lubrication shall not be accepted

2.2.f 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.a The cooling tower basin shall be provided with an ANSI-125 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. 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 externally in the condenser water piping.

2.3.b. 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 and with the same diameter as the outlet pipe connection. Flume boxes shall not be accepted

**2.5** **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.

2.5.a An access ladder made of hot dip galvanized steel (*SS-304 or SS-316 also available)* shall be provided for access to the fan deck. Ladder shall be equipped with a safety cage which shall comply with OSHA standards.

2.5.b. Two hinged access doors per each cell shall be provided, dimensions of each door not to be less than 39” high x 25” wide each for easy access of maintenance personnel

2.5.b. An internal walkway made of FRP and HGDS structure (*SS-304 or SS-316 also available)*, with anti-skid surface shall be provided. Internal walkways with open spaces shall not be accepted. All working surfaces shall be designed to withstand 50 psf or 200 lbs live load. Other components of the cooling tower, i.e. basin floor and fill/drift eliminators, shall not be considered an internal working surface. Cooling tower manufacturers that require that these surfaces be used, as a working platform shall provide a two year extended warranty to repair any damage to these surfaces caused by routine maintenance.

2.5.c An internal ladder with secondary catwalk shall be provided at a height that allows maintenance personnel to work on the fan assembly without the use of any other methods of access to such height. These to be made of HDGS (*SS-304 or SS-316 also available)*

2.5.d A 1" hot dip galvanized steel (*SS-304 or SS-316 also available)* pipe handrail shall be provided around the perimeter of the cooling tower. The handrails shall be provided with knee and toe rails. All the components shall comply with OSHA standards.

**2.6 Cooling Tower Accessories**

2.6.a (Optional) **Vibration Cutout Switch**: Provide electronic vibration switch with contact for BAS monitoring. Wiring shall be by the installing contractor. The electronic vibration cut out switch will be guaranteed to trip at a point so as not to cause damage to the cooling tower to ensure this the trip point will be 0.6 in/sec.

2.6.b (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.

2.1.c Standard Warranty shall cover manufacturing defects for a period of 12 months from start-up date, or 18 months from invoice date, whichever occurs first. Warranty covers parts replacement only FOB port of origin 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 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