PART 1 - GENERAL

These standards and procedures apply to the design and installation of field erected, induced-draft, counter-flow, and ceramic tile filled cooling towers.

1.01 DESIGN CRITERIA

A. Drawings and Specifications:

1. Locate intake to avoid short cycling of air. Ensure that discharge is not located near outside air intakes.
2. Provide service access to all equipment. Provisions shall be provided for fan and gear box removal.
3. Indicate requirements for seismic protection measures for all mechanical and electrical equipment.
4. Provide condenser water flow diagrams.
5. Provide water treatment and filtration system.
6. Specify that cooling towers shall be tested in accordance with CTI Test Code ATC-105.

B. Design:

1. Capacity: Unit and piping system should be sized with 10 to 15-percent extra capacity on design-day conditions.
2. Piping: Size piping system to match future capacity provided at the cooling tower, maximum water velocity = 8-feet per second, maximum water pressure drop 4-feet per 100 lf.
3. Design for 95oF entering water and 15oFΔt.
4. Size cooling towers based on 0.4% WB and mean coincident dry bulb temperature from ASHRAE Weather Data Table.
5. Controls: Direct Digital Controls shall be utilized. Valve actuators shall be pneumatic.
6. Select cooling towers for the maximum noise level in accordance with CTI Standard ATC-128 during full speed operation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide field erected cooling towers of one of the following:
   1. Tower Engineering Inc., Fort Worth, Texas.
   2. Ceramic Cooling Tower Corp., Div. of BDT Technologies.
   3. Marley.

2.02 FIELD ERECTED COOLING TOWERS

A. Unless otherwise indicated, stainless steel type 304 shall be used for rods, plates, and piping.

B. Lintels: Heavy duty cast iron lintels conforming to ASTM A48.

C. Tile Fill: Hard-burned clay tile, arranged in pattern without mortar and sufficient height to meet performance capacity indicated plus 25 percent.

D. Mist Eliminators: 3-pass cellular type constructed of UV protected PVC type. Allowable drift shall not exceed 0.0015-percent of the water flow.

E. Speed Reducer: Speed reducer gears shall be rated in accordance with practices of the American Gear Manufacturers Association using a Service Factor of 2. The gear reducer shall be of the helical, double-reduction type. Ratings in accordance with CTI STD-111.

F. Fan Assembly: Fan shall be of multi-blade design with fiberglass reinforced epoxy or resin blade system.

G. Drive Connection: The drive shaft shall be either “all stainless steel” or “graphite composite,” full floating type, with non-lubricated flexible 316 stainless steel couplings at both ends.

H. Water Distribution System: Distribution system shall be designed for water distribution with complete and equal spray coverage over entire fill top surface from a minimum 60 to 120-percent of design flow. Dual distribution systems or low-pressure gravity flow design will not be permitted. Mechanically fastened, rubber grommet type of nozzle adapters will not be permitted.

I. Tower Access: Provide fiberglass access doors, walkways, and ladders for all servicing and maintenance requirements.

J. Miscellaneous:
   1. Fan Vibration Switch with remote reset located outside the fan stacks.
   2. Stainless steel oil level sight glass with 304 stainless steel piping, located outside the fan stacks.
   3. Speed Reducer Low Oil Level Warning Switch: Provide low oil level warning switch to indicate low oil level conditions. Low oil level warning shall be set to allow maintenance personnel to inspect, repair and restore proper oil level prior to low oil level fan shutdown conditions. Low oil level warning switch shall be wired to Section 200920 "Direct Digital Control System."
   4. Speed Reducer Low Oil Level Alarm Switch: Provide low oil level alarm switch to shutdown fan operation prior to speed reducer potential failure. Low oil level alarm switch shall be wired to fan variable frequency drive safety shutdown terminals.
   5. Drip Edge Deflectors: Provide 304 stainless steel drip edge deflectors (14-gauge minimum) at the top of intake openings to prevent water loss external to catch basin. Drip edge deflectors shall not reduce tower capacity indicated.
   6. Fasteners, Rods, Anchor Bolts, Anchors and Sleeves: Unless otherwise indicated, provide Type 304 or Type 316 stainless steel.

END OF SECTION