EVAPCO Water Saver Pre-Treatment
for Evaporative Cooling Systems

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Includes:

1. Provide capacitive deionization pre-treatment system.
2. Completely coordinate with work of all other trades.
3. See Division 1 for General Requirements.
4. Services of manufacturer's representative company to provide PLC controlled pre-treatment system and equipment as specified herein.

B. Description of System:

1. Uses the process of capacitive deionization to proportionally remove dissolved ions from the make-up water.
2. Improved make-up water quality increases the cycles of concentration for the evaporative cooling units.
3. Reduction in blowdown water for evaporative cooling equipment.

1.2 SUBMITTALS (See Division 1)

A. Submit per the requirements Division 1.

B. Shop drawings: Show all water treatment equipment, including the following:

1. Piping and Instrumentation Diagrams (show all field piping required, if any).
2. PLC control panel and wiring diagrams (show all field wiring required). Include bill of materials showing model number, manufacturer, physical layout drawings, panel and equipment catalog cuts.

C. Installation Operation and maintenance manuals

1. Provide a copy of IOM with equipment.

D. Laboratory make-up water sample analyses: Submit a copy of the site specific make-up water analysis to document the water quality available at the project site. Make-up water test analysis to include at a minimum the analysis of the following compositions of the water, field testing shall not be accepted:

1. *Calcium Hardness (as ppm $CaCO_3$)*
2. *Total Hardness (as ppm $CaCO_3$)*
3. *Total Alkalinity or m-Alkalinity (as ppm $CaCO_3$)*
4. *pH*
5. *Silica (as SiO_2)*
6. *Specific Conductivity (micro S/cm)*
7. *Sulfate (as SO_4)*
8. *Chloride (as Cl-)*

9. *Phosphate (as PO_4)*

10. *Iron*

11. *Copper*

12. *Manganese*

1.3 QUALITY ASSURANCE

A. The water treatment supplier shall:

1. Obtain water samples from the site and furnish a laboratory analysis of the water supply with submittal.

2. Review the make-up water analysis to ensure compatibility with the water treatment program.

3. Propose the increase in cycles of concentration by implementing the capacitive deionization pre-treatment system on the makeup water to the evaporative cooling unit.

1.4 PERFORMANCE CRITERIA

A. Pre-treatment system shall provide ≥ 75% recovery of raw makeup water

B. Selection Criteria

1. Manufacturer: Evapco

2. Unit Type (cooling tower, evaporative condenser, closed circuit cooler):

3. Total Load: MBH

4. Site Makeup Conductivity: mhos

5. Site Makeup Silica: ppm

6. Current/Design Cycles without Water Saver:

7. Desired/Optimized Cycles with Water Saver:

8. Recovery: %

9. Electrical Specification: 230/3/60 3-wire (delta) or 460/3/60 4-wire (wye)

10. Number of Loops:

C. If reclaim water is to be supplied to the inlet of pre-treatment system, water shall meet the following:

1. Conductivity: <850 mhos

2. Alkalinity: <150-ppm (as $CaCO_3$)

3. Ammonia: <0.20-ppm

4. Calcium Hardness: <150-ppm (as $CaCO_3$)

5. Chloride: <130-ppm

6. Total Organic Carbon (TOC): <10 mg/l

7. Oil & Grease: <1.0 mg/l

8. pH: 6.0 to 8.0

9. Silica: <25-ppm

10. Total Suspended Solids (TSS): <25-ppm

11. SDI 15: <5

12. Iron: <5 ppm

13. Copper: <0.5 ppm

PART 2 - PRODUCTS

2.1 PRE-TREATMENT SYSTEM

A. Acceptable Products:

1. EVAPCO Water Saver Capacitive Deionization Pre-Treatment System

B. Provide a Capacitive Deionization system capable of reducing dissolved ion concentration, other than silica, by 35% to 60% while achieving a recovery rate of 75% to 90%.

C. Sizing of the Capacitive Deionization system is based on project goals.

D. Electrical Requirements:

1. The system shall have a maximum power draw of 36.5 amps for 230V, and 23.1 amps for 480V.

2. The system shall operate on a single 230V, 3-phase, 3-wire (delta) or 480V, 3 phase, 4-wire (wye)

3. The electrical panel shall meet UL and cUL specifications.

4. The PLC shall be enclosed in a NEMA 4 water resistant shell and be provided with Human Machine Interface (HMI), and have a ventilation fan.

E. Construction Requirements:

1. The pre-treatment skid shall be mounted on a galvanized steel frame and anchored indoors near a sanitary drain.

2. The system shall have USB Data Download capability.

3. The pre-treatment skid shall include the following water meters:

a. Inlet

b. Outlet to Process

PART 3 - EXECUTION

3.1 INSTALLATION AND SERVICES

A. Installation of pre-treatment system will include:

1. Sanitary drain shall be provided near the installation location of the pre-treatment skid.

2. Piping to and from the pre-treatment skid shall be provided "by others."

3. Provide instructions to installing contractor for field installation of pre-treatment system by-pass line for use during emergency or temporary filling of the evaporative cooling unit.

4. Systems utilizing a make-up water tank shall be sized based on makeup water rate of the evaporative unit. The make-up tank shall be sized to hold a minimum of twenty-five (25) minutes worth of water using the average make-up rate of the unit. Make-up water tank and Electronic Water Level Controller (EWLC) to be provided by pre-treatment system supplier. Pump and pump sizing "by others".

5. Include 50 micron filtration before pre-treatment system when required.

6. The pre-treatment skid shall include an inlet and clean output water meters.

7. Clean In Place (CIP) tank, piping or tubing, pump and chemistry shall be provided with the skid (may ship separately).

B. Provide all consulting services, for a period of 1-year from start-up of the cooling system, which will include:

1. Installation and system start-up procedure recommendations.

2. Initial water analysis and recommendations.
3. Training of operating personnel on proper control techniques.
4. Routine field service visits.
5. Any necessary log sheets and record forms.
6. Any required laboratory and technical assistance.

C. All services will be provided by a Factory Authorized Service Partner of the evaporative cooling unit manufacturer.