# CHEMTROL® CT6000 CONTROLLER

**BID SPECIFICATION (03/2014)**

**WATER TREATMENT AUTOMATION SYSTEM**

A. **A PROGRAMMABLE WATER TREATMENT AUTOMATION SYSTEM** shall be supplied for continuous monitoring of the water conductivity (or TDS), pH, temperature, Langelier Saturation Index, fill and bleed flow rates, influent and effluent pressures and for the automatic control of bleed and fill valves, chemical feeders, main recirculation pump and filter backwash. The controller shall include a programmable microprocessor with an eight (8)-line display screen and a 16-key front panel keyboard with numerical input for operator access.

B. The system shall be a **CHEMTROL® CT6000 PROGRAMMABLE CONTROLLER** of current design and model manufactured by SANTA BARBARA CONTROL SYSTEMS of Santa Barbara, California or a technically equal system certified by the specifying agent as capable of providing equal performance for all operating functions.

C. Exceptions to the specifications shall be described in detail together with a list of ten (10) similar operating systems of same model and manufacture, with the name, address and telephone number of operating personnel.

**D. SPECIFICATIONS**

1. The controller shall automatically maintain the water conductivity or TDS level below a user-defined value by actuating the solenoid valve on the bleed line. The operator shall be able to adjust deadband zone to prevent chattering of the solenoid valve. The following operational modes shall be available: off, manual, cycle timer.

2. The controller shall automatically maintain the pH level within a user-defined range by activating either an acid or a basic chemical feeder. The operator shall be able to choose between on/off control or proportional feed control with adjustable deadband and progressive zones. The controller shall also be capable of actuating the chemical feeder in the following modes: off, manual, cycle timer.

3. The controller shall automatically maintain the ORP level within +/- 10 mV of a user-defined level by activating a chemical feeder for an oxidizing biocide. The operator shall be able to choose between on/off control or proportional feed control with adjustable deadband and progressive zones. The controller shall also be capable of actuating the chemical feeder in the following modes: off, manual, cycle timer. In addition, the operator shall be able to schedule a 7-day program for shocking (superchlorination) and deshock.

4. The controller shall monitor and display the water temperature. The operator shall be able to select automatic temperature compensation for pH and/or conductivity readings with an adjustable temperature compensation slope for conductivity.

5. All setpoints and calibration levels shall be adjustable with a numeric keypad mounted on the front panel of the unit. For all sensor inputs, the operator shall have the choice - depending on the accuracy needed - of using either 1-, 2-, or 3-point calibration to determine respectively the origin, slope and curvature of the calibration curve. Controllers with internal switches or calibration adjustments and/or requiring special signal generating equipment to service shall not be considered equal.

6. The controller shall include programmable high and low alarms for all control functions using sensor inputs with operator selectable feed/bleed lockout and alarm buzzer options.

7. The controller shall continuously monitor and alert for failure of the pH and ORP probes using dynamic probe testing before the water chemistry gets out of range. Failure alarms based on safety timers or out-of-range alarms will not be considered equal.

8. The controller shall include an adjustable seven-day program for automatic sensor cleaning using a chemical pump (not included). The sensor cleaning program shall provide an adjustable recovery time for the sensors.

9. The controller shall continuously calculate and display the Langelier Saturation Index using either sensor data and/or manual input for pH, temperature, total alkalinity, and calcium hardness. The water saturation condition shall be displayed on the main screen as either: ”Scaling”, “Corrosive”, or “OK”.

10. The controller shall be capable of actuating each chemical additive feeder in the following operator-selectable modes: off, manual, bleed & feed, bleed-then-feed, cycle timer, percent of flow, daily schedule and 2-week schedule. The operator shall be able to choose to lock the chemical feeder when the bleed valve is activated and to accumulate feeding time during lock-out for delayed feed, to lock the bleed valve when the chemical feeder is activated and to actuate pre-bleed and pre-pH programs before feeding. In addition, the operator shall be able to schedule a delayed single shot booster feeding program for each additive feeder.

11. For each valve and chemical feeder, the controller shall record and display the elapsed run time of each activation event and a cumulative run time resettable at any time by the operator. The controller shall include operator-adjustable safety time limit alarms that automatically locks out the valve or chemical feeder. The run time alarm shall also be adjust able.

12. The controller shall be capable to display the flow rates and cumulative volumes of make-up and bleed water using either hall-effect or reed-switch watermeters (not included). Three (3) resettable water totalizers will be available for each water flowmeter.

13. The controller shall include an optical water level sensor and automatic control for a solenoid valve on the fill line. The controller shall record and display the elapsed run time of each activation event and a cumulative run time resettable at any time by the operator. The controller shall include operator-adjustable safety time limit alarms that automatically locks out the valve.

14. The controller shall include a seven-day program for the main recirculation pump.

15. The controller shall include two transducers for monitoring the influent and effluent pressures at the filter (or filters) with adjustable high and low alarms. The controller shall automatically control backwash of filter (or filters) in the following operator-selectable modes: off, manual, pressure differential, daily schedule, pressure differential or daily schedule, pressure differential and daily schedule.

16. The controller shall be contained in a NEMA 4X rating lockable fiberglass cabinet with an LCD graphic display screen of eight (8) lines of twenty two (22) alphanumeric characters. A front panel 16-key touch pad shall be provided for direct access to all the menus and submenus and for entering numerical data. The main screen shall display current readings, control modes and operational status for conductivity/TDS, pH , ORP , temperature, make-up and bleed flows, influent and effluent pressures , as well as control modes and operational status of chemical additives feed pumps. Controllers with smaller displays or displays that require scrolling through menus will not be considered equal. All screens shall have the capability of being displayed at any time in unabbreviated English, French or Spanish and in US or metric units.

17. The sensor bypass line shall be equipped with an in-line filter, a safety flow switch and a sampling spigot. The Conductivity/Temperature, pH and ORP sensors shall be mounted in a see-through flow cell with a clear cover located inside a lockable fiberglass enclosure with a window.

18. The controller shall be factory set to water treatment industry standard. The operator shall be able at any time to adjust all programmable functions to preferred settings. The controller shall have a reset mode to reset all or selected functions to the original factory standards. Controllers with full reset only shall not be considered equal.

19. The controller shall include a memory storage battery with minimum reserve power for six (6) months.

20. The controller shall include on-board memory chip for storing of test data on operator-adjustable schedules. Operator shall be able to download data on-site through USB serial communications ports to a computer. The controller shall also include an RS485 serial communication port to enable remote communications with up to thirty (30) controllers via a single computer.

21. The controller shall include an Webserver communication capability for remote operation using any web-capable device, via an Ethernet / Internet network connection. Access to the unit will be through two security levels. You will only have access to the unit if you have the Username and Password for the company through the website; and if you have the access code, which is programmed at the controller. All of the operational software is embedded within the website. This access will give you true duplex operation capability representing the actual controller screen display with automatic downloading and visual graphics representation of test data. Controllers using simulation or virtual representation of the display screen shall not be considered equal.

22. The controller shall have, through the Webserver interface, communication capability including alarm callout to six (6) contacts to report alarm conditions via SMS text or email notification.

23. . The controller shall include up to three ultrasonic transmitters, which can be mounted at the top of closed or lidded chemical tanks. These transmitters will allow monitoring of chemical inventory, which will be displayed on the controler. Also, the controller will provide alarm output when the inventory level in the tank falls below a certain percentage. This alarm setting is operator programmable.

24. The controller electronics shall be covered by a standard manufacturer warranty of five (5) years. Special extensions of more limited warranties shall not be considered acceptable. All sensors will be covered by a standard one (1) year warranty. Other parts shall be covered by their own manufacturer's warranty. The controller shall not require a service technician for annual calibration, seasonal start-up, or whenever chemicals supplier or type are changed.

25. The manufacturer shall supply a complete instruction, operating and maintenance manual. Check-out of installation, start up, and instruction of operating personnel shall be performed by an authorized and properly trained manufacturer representative.

## E. OPTIONS

26. 420 OPTION: A multiple-channel converter board shall be provided to convert the sensor digital signals for Conductivity (TDS), pH, ORP, and temperature into analog 4-20 mA signals for monitoring on Building Management Systems (B.M.S.).

27. FLUOROMETER OPTION. The controller shall include a fluorometer which will measure the concentration of fluorescent dye in the sample stream. The controller shall be able to automatically maintain the concentration of the chemical which contains the fluorescent dye. The operator shall be able to choose between on/off control or proportional feed control with adjustable deadband and progressive zones.

28. CORROSION MONITOR OPTION. The controller shall include a module or modules to allow the measurement of corrosion rate in the system for either one or two materials. The intention is to match the material(s) or either the tower basin and/or the chiller tubes. The controller shal be able to display the corrosion rate in mils per year (mpy) of either one or two materials.

29. MODBUS OPTION: The controller shall include software-based conversion of sensor signals, setpoint, high & low alarms, cummulative run time and total feed time for ORP, pH, PPM, Temperature, (Conductivity, Pressure influent and effluent, and Flow available with optional sensors) into MODBUS protocol for monitoring on Building Management Systems. Using data converters, this option allows us to provide other common protocols: Bacnet MSTP, Bacnet TCP/IP, Bacne IP, Lonworks, among others. The controller shall also allow MODBUS writing for changing control modes and setpoints from Building Management Systems. Controllers offering monitor only of MODBUS data stream shall not be considered equal.