



ZETA CORPORATION

Electronic Deposit & Corrosion Control for Water Systems

CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI)

DIVISION 16, SECTION 15185 WATER TREATMENT EQUIPMENT - ZETA ROD™

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Patented capacitor-based water treatment system (Zeta Rod™ system) designed to electronically disperse bacteria and mineral colloids in aqueous fluids, thereby controlling and preventing biofouling and mineral scale. The system shall consist of Zeta Rod™ electrodes, power supplies and connecting wire in quantities and sizes required for effective treatment of the application as per manufacturer's recommendation. The system shall be provided to protect industrial cooling equipment, reverse osmosis membranes, flocculation processes, glass making shear spray lubricants, metal working fluids, and water distribution piping as noted on Drawings and as specified herein.

<p>SPECIFIER NOTE: Verify that the following specification sections are included in the Project Manual and that the section numbers correspond with the section numbers used in the Project Manual. The following related sections are based upon the current 1995 CSI MasterFormat.</p>

- B. Related Sections:
1. Section 15050 – Basic Mechanical Materials and Methods.
 2. Division 16 - Wiring Connections: Execution requirements for electrical connections specified by this section.

1.02 SUBMITTALS

- A. Shop Drawings: Indicate system schematic in relation to equipment being treated, system component locations, controls schematics, electrical characteristics and connection requirements.
- B. Product Data: Submit information on materials and system including electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Submit manufacturer's installation instruction as included in "Installation, Operation and Maintenance Manual".

- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly.
- F. Project Record Documents: Record as-built locations of system components, and piping.
- G. Operation and Maintenance Data: Submit data on equipment including spare parts lists, procedures, and treatment programs. Include manufacturers "Installation, Operation and Maintenance Manual".

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Meet local electrical, plumbing and mechanical safety codes.
 - 2. Perform Work in accordance with recognized standards.
- B. Supplier Qualifications:
 - 1. Insurance:
 - a. Provide certificate of insurance at time of bid submittal. Certificate from insurer possessing an A+XV rating.
 - b. Provide proof of liability insurance coverage of no less than one million dollars per occurrence.
 - 2. Credit History: Clear credit history with no evidence of bankruptcy or insolvency within the past 2 years.
 - 3. Intellectual Property: Present clear evidence of ownership of intellectual property, including licenses or title to patents on equipment and or technology used in fulfillment of this contract
 - 4. Spare Parts: show evidence of a reasonable stock of spare parts or replacement of a uniform grade and specification.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.

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1.05 WARRANTY

- A. System shall be warranted against defects in material and workmanship for no less than 3 years as per manufacturer's standard limited warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specifications are based upon products as manufactured by Zeta Corporation, 2045 N. Forbes Blvd., Suite 102, Tucson, AZ 85745 (888) 785-9660, <http://www.zetacorp.com>

2.02 MATERIALS

- A. High-voltage wire: Uniform wire gauge with construction and insulation rated to at least 40 kVDC over the entire length for connections between power supplies and electrodes, as furnished by manufacturer. Note: must be provided by manufacturer to maintain system warranty.
- B. Insulating Compound: As furnished by manufacturer.
- C. PVC Primer and Cement: As approved by manufacturer.
- D. Teflon™ Tape: 3/4 inch width.

2.03 EQUIPMENT

- A. Tools required:
 - 1. 1-3/4 inch crescent wrench.
 - 2. Medium Phillips-head screwdriver.
 - 3. Small adjustable ("crescent") wrench or metric socket drivers.
 - 4. Temping tool (clean bolt or rod with diameter of 1/4 inch to 1/2 inch.
 - 5. Wire cutters
 - 6. Crimpers (22-14 AWG).
 - 7. Utility knives.

2.04 COMPONENTS

- A. Electrode(s):
1. General Requirements:
 - a. Abrasion resistant with a hardness equivalent to 9.0 Mohs hardness.
 - b. Chemically inert to acids, alkalis and solvents.
 - c. Unitized construction with no seams, joints, or seals on the electrode body.
 - d. Capable of continuous operation at working temperature up to 400 degrees F (204 degrees C) and pressures up to 500 psi (3447kPa).
 - e. Made of a material possessing a high dielectric constant tested to pass no current up to a voltage potential of at least 40kV DC.
 - f. Provide each electrode with an insulator assembly constructed of heavy gauge schedule 80 PVC.
 2. Provide the following Zeta Rod™ electrodes as applicable:
 - a. Zeta Rod™ Model ZR36S
 - 1) Total Length: 46.25 inches (117 cm)
 - 2) "Dry" Length: 12.25 inches (31.1 cm)
 - 3) "Wet" Length: 34 inches (86 cm)
 - 4) Body Diameter: 1.25 inches (3.18 cm)
 - 5) Adapter Fitting: 1.5 inch (3.76 cm) male NPT 316 Stainless Steel
 - b. Zeta Rod™ Model ZR24S
 - 1) Total Length: 34.25 inches (87 cm)
 - 2) "Dry" Length: 12.25 inches (31.1 cm)
 - 3) "Wet" Length: 22 inches (56 cm)
 - 4) Body Diameter: 1 inch (2.54 cm)
 - 5) Adapter Fitting: 1.5 inch (3.76 cm) male NPT 316 Stainless Steel
 - c. Zeta Rod™ Model ZR18S
 - 1) Total Length: 28.25 inches (72 cm)
 - 2) "Dry" Length: 12.25 inches (31.1 cm)
 - 3) "Wet" Length: 16 inches (41 cm)
 - 4) Body Diameter: 1 inch (2.54 cm)
 - 5) Adapter Fitting: 1.5 inch (3.76 cm) male NPT 316 Stainless Steel

- d. Zeta Rod™ Model ZR8P
 - 1) Total Length: 11 inches (27.94 cm)
 - 2) "Dry" Length: 4.25 inches (10.8 cm)
 - 3) "Wet" Length: 6.75 inches (17.14 cm)
 - 4) Body Diameter: 0.75 inches (0.64 cm)
 - 5) Adapter Fitting: 1 inch (2.54 cm) male NPT PVC
- B. Power Supplies:
1. General Requirements:
 - a. Produce a DC Output of at least 30 kV with a maximum current output of 600 μ A.
 - b. Operate over an input voltage range of 90 to 240 VAC 50-60 Hz.
 - c. Fused to protect against over-current conditions.
 - d. Consume less than 120 Watt-hours per day in continuous operation.
 - e. Provided with automatic shut-off circuit that shall activate when the output voltage drops below 50% of its nominal value.
 - f. Enclosed in a NEMA 4-X or higher rated enclosure.
 2. Provide the following power supply as applicable:
 - a. Zeta Rod™ System Power Supply: Model ZRPOV
 - 1) Enclosure Size:
 - a) Width: 4 inches (10.16 cm)
 - b) Height: 8.75 inches (22.23 cm)
 - c) Depth: 5.25 inches (13.33 cm)
 - 2) Input power: 90-240 VAC, 47-63 Hz
 - 3) Designed to energize up to 3 electrodes.
 - 4) LED status indicator.
 - 5) On/Off (I/O) switch
 - 6) No alarm or external signal capability.
 - 7) Power plug type: U.S. flat pin 3-conductor: CE standard wiring: hot (brown) /neutral (blue) /ground (green & yellow).
 - 8) Output power: 30 KVDC.
 - b. Zeta Rod™ System Power Supply: Model ZRPGM
 - 1) Enclosure Size:
 - a) Width: 6 inches (15.24 cm)
 - b) Height: 10.75 inches (27.31 cm)
 - c) Depth 7.25" (18.41 cm)

- 2) Input power: 90-240 VAC, 47-63 Hz
 - 3) Output power: 35KVDC
 - 4) Designed to energize up to 8 electrodes.
 - 5) LED power indicator and LED fault indicator.
 - 6) Arc detection circuit with manual reset that interrupts high voltage output and activates on a single arc occurrence.
 - 7) Normally closed relay circuit that provides power equivalent to input power upon activation of arc detector.
 - 8) 4-20 mA signal output proportional to the power supply high voltage output. (4 mA + 0 volts, 20 mA = 35 KVDC)
 - 9) Power plug type: U.S. flat pin 3-conductor: CE standard wiring: hot (brown) /neutral (blue) /ground (green & yellow).
- c. Zeta Rod™ System Power Supply: Model ZRPJR
- 1) Size:
 - a) Width: 4 inches (10.16 cm)
 - b) Height: 8.75 inches (22.23 cm)
 - c) Depth: 5.25 inches (13.33 cm)
 - 2) Input power: 90-240 VAC, 47-63 Hz
 - 3) Designed to energize one Zeta Rod™.
 - 4) LED status indicator.
 - 5) No alarm or external signal capability.
 - 6) Power plug Type: U.S. flat pin 3conductor: CE standard wiring: hot (brown) /neutral (blue) /ground (green & yellow).
 - 7) Output power: 35 KVDC.
3. Power Supply Accessories:
- a. Zeta Rod™ system Model ZRLAS (Light Activated Switch): Designed to take the signal supplied to the LED for power supply models ZRPOV and ZRPJR and activate a normally open switch.
 - 1) Enclosure Size:
 - a) Width: 4 inches (10.16 cm)
 - b) Height: 2 inches (5.08)
 - c) Depth: 2.25 inches (7.72 cm)
 - 2) Input Signal: Use LED wires from ZRPOV or ZRPJR
 - 3) Input Power : 110 – 220 V AC, 50-60 Hz

- 4) Output Power: Same as input power supplied
 - 5) Switch Position: Closed when power supply operating properly, open when high voltage output of power supply falls below 50% of its nominal value.
- C. Reaction Chambers (if required):
1. General:
 - a. Reaction chambers are constructed of PVC piping with a stainless steel liner and three openings: one for incoming water, a second for outgoing water and a third at one end of the chamber for insertion of the electrode. As water flows through the reaction chamber, it is exposed to the high electrostatic field of the electrode mounted in the chamber.
 - b. A reaction chamber shall be provided when it is not practical to insert the electrode directly into the water stream to be treated, as follows:
 - 1) When the pipe diameter at the optimum electrode location is less than 3 inches.
 - 2) When the vessel or piping into which the electrode is to be inserted is plastic, fiberglass or other non-conductive material (the electrode requires a nearby grounded metal surface against which to form the electrostatic field).
 - 3) When the layout of the system precludes insertion of the electrode into existing vessels or piping due to space or other physical constraints.
 2. Provide the following as applicable for the electrodes to be furnished:
 - a. Model ZR200
 - 1) Sized for Zeta Rod™ Model: ZR18S
 - 2) Chamber Material: Schedule 80 PVC
 - 3) Length: 22.5 inches (57 cm)
 - 4) Diameter: 4.5 inches (11.4 cm)
 - 6) Water inlet and outlet openings: 2 inches in diameter.
 - b. Model ZR200C
 - 1) Sized for Zeta Rod™ Model: ZR18S
 - 2) Chamber Material: Schedule 80 CPVC (to 210 degrees F)

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- 3) Length: 26.5 inches (67.3 cm)
 - 4) Diameter: 4.5 inches (11.4 cm)
 - 5) Water inlet and outlet openings: 2 inches in diameter.
- c. Model ZR300
- 1) Sized for Zeta Rod™ Model: ZR24S
 - 2) Chamber Material: Schedule 80 PVC
 - 3) Length: 28.5 inches (72.4 cm)
 - 4) Diameter: 4.5 inches (11.4 cm)
 - 5) Water inlet and outlet openings: 2 inches in diameter.
- d. Model ZR300C
- 1) Sized for Zeta Rod™ Model: ZR24S
 - 2) Chamber Material: Schedule 80 CPVC (to 210 degrees F)
 - 3) Length: 32.5 inches (82.6 cm)
 - 4) Diameter: 4.5 inches (11.4 cm)
 - 5) Water inlet and outlet openings: 2 inches in diameter.
- e. Model ZR400
- 1) Sized for Zeta Rod™ Model: ZR18S
 - 2) Chamber Material: Schedule 80 PVC
 - 3) Length: 47 inches (119.4 cm)
 - 4) Diameter: 7.5 inches (19.1 cm)
 - 5) Water inlet and outlet openings: 3 inches in diameter.
- D. System Standards Certifications:
- 1. Conforms to Underwriters Laboratories Standard 1012 and bears the stamp of a testing laboratory that certifies that the system complies with FCC part 15 subpart B emission ratings.
 - 2. Certified to Canadian CAN/CSA C22.2 No. 1010.1 and Complies with European CE standards.
 - 3. Allow for multi-plexing or use of multiple electrodes on a single power supply.
 - 4. Inter-connected with commonly available conduit couplings that meet NEMA 4X ratings for liquid intrusion.
 - 5. Certified to meet Class 1 Division 1 Industrial Control Equipment for Hazardous Locations: conforms to UL Standard 698.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect/Owner. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.02 PREPARATION

- A. Drain water from piping or vessels where electrodes will be installed.

3.03 INSTALLATION

- A. Install work in accordance with manufacturers "Installation and Operation Manual" and recognized industry standards.
 - 1. Install bulkhead, thread-o-let, or other fittings required to mount electrodes.
 - 2. Install conduit in compliance with local codes and in accordance with Division 16 - Electrical. When hard-wiring power supplies to a source of AC power, ensure that the supply circuits are turned off during installation.

3.04 FIELD QUALITY CONTROL

- A. Upon completion, verify the following:
 - 1. All electrodes installed and all insulator assemblies glued.
 - 2. High voltage wire is connected to all electrodes and power supplies.
 - 3. Ground lug on bottom of power supply is connected to a good earth ground.
 - 4. Insulating compound in place on all high-voltage wire connections.
 - 5. Wire caps hand tight on insulating fittings.
 - 6. High-voltage wiring enclosed in conduit in accordance with code.
 - 7. Power supply enclosure secured closed.
 - 8. Power supply connected to appropriate source of AC power.
 - 9. Plumbing connections are tight and leakfree.