

## SECTION 46 41 17

### INLINE STATIC MIXERS

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Scope:
  - 1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install static mixers complete and operational.
  - 2. Equipment locations are as shown.
- B. Coordination:
  - 1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the static mixing equipment Work.
- C. Related Sections:
  - 1. Section 09 91 00, Painting

##### 1.2 REFERENCES

- A. Standards referenced in this Section are listed below:
  - 1. American National Standards Institute (ANSI).
    - a. ANSI/NFS Standard 61, Drinking Water System Components Health Effects
  - 2. American Society for Testing and Materials, (ASTM).
  - 3. National Fire Protection Association (NFPA) Standard 704 – Label System.
  - 4. Occupational Safety and Health Administration (OSHA) Standards for General Industry, Subparts 1910.1200 Hazard Communication (July 1986).
  - 5. Uniform Fire Code.

##### 1.3 QUALITY ASSURANCE

- A. Static Mixer Manufacturer's Qualifications:
  - 1. Manufacturer shall have experience in manufacturing static mixers for chemical systems of the same or larger size to the devices specified.
  - 2. Manufacturer shall show evidence of a minimum of five substantially similar installations for which static mixers have been in satisfactory operation for a minimum of five years (each).

- B. Component Supply and Compatibility:
1. Static mixer provided under this Section shall be obtained from a single supplier or manufacturer who, with the CONTRACTOR, shall assume full responsibility for the completeness of the system.
  2. The supplier or manufacturer shall be the source of information on static mixers furnished regardless of the manufacturing source of that equipment.
  3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall equipment by the static mixing equipment manufacturer.

C. Certifications

1. Certificate of Compliance
  - a. Provide three, original, notarized certificates of compliance with the Contract Documents from the static mixer manufacturer on manufacturer letterhead and signed by an authorized official; certification by manufacturer’s representatives is not acceptable.
  - b. Certificate shall be worded as follows:

“*[Insert manufacturer’s name]* proposes to supply equipment included in Section 46 41 17 for Paulding County, Georgia, Richland Creek Water Treatment Plant construction. We have examined the Contract Documents and understand the Project requirements insofar as they affect the proposed products. Except as may be specifically exempted in Section 46 41 17, we accept unit responsibility for the products specified in this Section, and certify that the products are compatible, meet the requirements of the Contract Documents, and comprise a functional unit that will operate satisfactorily under the conditions described in the Contract Documents:

*[List exceptions, deviations or changes necessary or recommended to accommodate the proposed products.]*

We further certify that the products to be furnished shall conform to the standards listed in Section 46 41 17, Inline Static Mixers, of the Contract Documents.

*[List exceptions, deviations or changes necessary to accommodate the proposed products.]*

\_\_\_\_\_  
Authorized Signature & Title

\_\_\_\_\_  
Date

- c. Provide justification for exceptions, variations, deviations, or changes. ENGINEER will determine whether exceptions, deviations, and changes are acceptable. Exceptions, variations, deviations, and changes may result in rejection of products.

- d. Provide certificate of compliance before submitting Shop Drawings. Shop Drawings will not be reviewed prior to receipt of the certificate of compliance.
- e. Acceptance of certification of compliance shall not relieve CONTRACTOR of responsibility for adequacy of all products.
- f. Submittal of certificate of compliance shall not relieve CONTRACTOR, equipment manufacturer, and Supplier of requirement to comply with Submittal procedures in the Contract Documents.

#### 1.4 SUBMITTALS

- A. Shop Drawings submittals shall include the following:
  - 1. Provide certificate of compliance prior to shop drawing submission, as specified in this Section.
  - 2. Illustrations, specifications and engineering data including: dimensions, materials, size, and weight for all piping and appurtenances including pipe supports, pipe restraints, coatings, etc.
  - 3. Manufacturer's instructions and recommendations for installation of pipe joints and special items.

#### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Section 01 65 00, Product Delivery Requirements, and Section 01 66 00, Product Storage and Handling Requirements.
- B. Deliver materials to the site to insure uninterrupted progress of the Work.
- C. Items that are damaged will not be acceptable. Protect all bolt threads, etc. from damage and corrosion.
- D. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- E. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

#### 1.6 WARRANTY

- A. The CONTRACTOR shall obtain from the manufacturer a warranty for the inline static mixers and appurtenances for 1 year from the date of Substantial Completion.

## PART 2 – PRODUCTS

### 2.1 IN-LINE STATIC MIXER

- A. The static mixer shall be a flanged pipe assembly mounted in-line in the process piping as shown on the Drawings.
- B. Location: Static mixers shall be provided as indicated in the table below.
- C. Filter influent mixer shall provide uniform mixing of sodium hypochlorite (6% solution) and aluminum sulfate (49% solution) into the filter influent water stream. The FE/GACE mixer shall provide uniform mixing of sodium hypochlorite (6% solution) and fluoride (hydrofluosilicic acid, 25% solution) into the FE/GACE water stream.
- D. The Static Mixer shall be designed to provide sufficient mixing at all specified flow conditions, by utilizing flow division and radial mixing action. The Static Mixer shall produce a uniform residence time distribution, such that all process fluids are exposed to the same mixing time. Stagnant flow pockets must not be present.
- E. Equipment shall be designed to be suitable for the process and service conditions as shown and indicated.
  - 1. Chemicals Added:
    - (a) Sodium Hypochlorite (6% solution)
    - (b) Aluminum Sulfate (49% solution)
    - (c) Hydrofluosilicic acid (25% solution)

Location:	Filter Influent	FE/GACE
Maximum Length of Static Mixer (in.)	43	48
Static Mixer Diameter (in.)	42	48
Minimum Plant Flow (mgd)	6.3	6.3
Maximum Plant Flow (mgd)	18	36
Minimum Downstream Water Pressure (psig)	0.5	4.2
Maximum Downstream Water Pressure (psig)	0.7	5.0
Maximum Pressure Drop Through Mixer at Maximum Flow (psi)	0.160	0.351
Maximum CoV at Maximum Flow	0.05	0.05
Maximum CoV at Minimum Flow	0.07	0.07

	Pre-Filter Chemicals		Post-Filter Chemicals	
	Sodium Hypochlorite	Alum	Sodium Hypochlorite	Hydrofluosilicic Acid
Flow Rate at 6.3 MGD Plant Flow (gph)	2.0	0.4	14.9	0.5
Flow Rate at 18 MGD Plant Flow (gph)	17.2	3.44	60.6	3.1
Flow Rate at 36 MGD Plant Flow (gph)	-	-	121.2	6.2

## 2.2 MANUFACTURERS

### A. Static Mixer Products and Manufacturers:

1. Chemineer-Kenics (National Oilwell Varco, L.P.), UTS Static Mixer
2. Westfall Manufacturing, 3050 (Single) Static Mixer
3. Koflo

## 2.3 DETAILS OF CONSTRUCTION

### A. General:

#### 1. Mixing Elements:

- a. The static mixer shall incorporate mixing elements that are solid, all welded, one-piece construction. Internal fasteners, retaining bars, or pins will not be permitted. The mixing elements shall be retained within the mixer housing by welds at each end of the element assembly to minimize vibration at high linear flow velocities.
- b. The element design should provide the maximum possible open channel area for fluid flow, to provide minimum head loss.

B. Housing: The housing shall be fabricated in Schedule Standard carbon steel.

C. Flanges: The flanges shall be ANSI B 16.5, 150-lb drilling, flat-face carbon steel.

D. Element Material: 316 Stainless Steel.

E. Internal and external surfaces of Mixers with carbon steel housings and flanges will be sandblasted and coated with an NSF 61 approved epoxy finish. Paint static mixer in accordance with Section 09 91 00.

F. Pressure Rating: 200 psi at 200 degrees F.

G. The Static Mixer housing and elements shall be engineered to withstand the rigors of the installation.

## 2.4 SOURCE QUALITY CONTROL

A. Visual Inspection: Verify that equipment complies with the Contract Documents

and approved Shop Drawings.

B. Packing:

1. Inspect prior to packing to assure that assemblies and components are complete and undamaged.
2. Protect machined surfaces and mating connections.
3. Protect bearings and gearing with a shop applied corrosion prevention coating.
4. Cover all openings into gear boxes with vapor inhibiting and water repellent material.
5. Crate in a manner, which will prevent damage during shipment, delivery and storage.
6. Identify crate contents by a packing slip fastened to the outside of the crate.

### PART 3 – EXECUTION

#### 3.1 INSPECTION

A. Field Inspection Prior to and During Installation:

1. Inspect and verify that structures or surfaces on which the equipment will be installed have no defects which would adversely affect the installation.
2. The CONTRACTOR shall promptly report, in writing, defects which may affect the Work to the ENGINEER. A copy of the manufacturer's field report shall be provided to the ENGINEER.

#### 3.2 INSTALLATION

- A. Installation of the static mixer and appurtenances shall be in accordance with the Drawings and with the manufacturer's instructions and recommendations. Conflicts of information shall be called to the attention of the ENGINEER.
- B. Inspect static mixer prior to installation; if damaged, notify the ENGINEER and manufacturer promptly. Do not install damaged static mixer until repairs are made in accordance with manufacturer's written instruction.

++ END OF SECTION ++