

SECTION 43 22 56.01
SUBMERSIBLE MIXERS

EQUIPMENT AND COMPONENT NUMBER(S)

MXR-2613: Bioreactor 1 Anoxic Mixer 1.
MXR-2614: Bioreactor 1 Anoxic Mixer 2.
MXR-2713: Bioreactor 2 Anoxic Mixer 1.
MXR-2714: Bioreactor 2 Anoxic Mixer 2.
MXR-2813: Bioreactor 3 Anoxic Mixer 1.
MXR-2814: Bioreactor 3 Anoxic Mixer 2.

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes the supply, delivery, Site storage, installation, testing and placement into operation of submersible mixers and axial-flow pumps, including all appurtenances required to complete an operating system as specified. The cost of all items in this section is to be included in the Schedule of Additional Unit Prices in the Form of Tender.
- B. Section includes supply and installation of all components necessary to install a submersible mixer in the anoxic and post anoxic zones of each Bioreactor 1, Bioreactor 2, and Bioreactor 3. Section includes supply of four submersible mixers and installation where directed by the Contracting Officer.
- C. The composite cable that is supplied with each submersible mixer and pump will be connected to an electrical plug under Division 26, Electrical.
- D. Motor starters, breakers, switchgear, external wiring and conduit for all equipment provided under this section will be done under Division 01, General Requirements.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American National Standards Institute (ANSI).
 - 2. American Water Works Association (AWWA).
 - 3. ASTM International (ASTM).
 - 4. Canadian Government Specification Board (CGSB).
 - 5. Canadian Standards Association (CSA).
 - 6. Electrical and Electronic Manufacturers Association of Canada (EEMAC).

1.03 DEFINITIONS

- A. Adequate Mixing: Variation in mixed liquor suspended solids of less than 10 percent between the mean value of samples taken at any two depths along any vertical line extending between water surface and floor.

1.04 SUBMITTALS

A. Action Submittals:

1. General layout, mast, complete engineering description, and performance characteristics.
2. Size, details, and complete list of materials.
3. Details of control panel and wiring schematics.
4. Commissioning reports.

B. Informational Submittals:

1. Installation Manuals. Submit installation manuals before shipment of any equipment. No payment will be made for equipment delivered before installation manuals.
2. Operation and Maintenance Data: As specified in Section 01 78 23, Operation and Maintenance Data. Submit operation and maintenance manuals before requesting initial start-up.

C. Submit all Drawings in SI.

1.05 QUALITY ASSURANCE

- A. Provide a written guarantee that the submersible mixer will provide uniform mixing of Mixed Liquor in one zone. If in the opinion of the Contracting Officer, the unit fails to uniformly blend the fluid, replace the unit with a suitable mixer at no additional cost to the Government.

PART 2 PRODUCTS

2.01 GENERAL

- A. Design the submersible mixers for continuous full load duty and guarantee the mixers based on the design conditions specified on the data sheet. Design and construct all units to permit economical maintenance. Select all units to allow as much interchangeability of parts as possible. Unspecified details of design and construction of the mixing unit will be manufacturer's standard.
- B. Equipment, materials, and accessories in this specification must be purchased from a single manufacturer.

2.02 SUBMERSIBLE MIXERS

A. Manufacturers and Products:

1. Flygt; Model S4220.
2. Or equal.

2.03 PHYSICAL CHARACTERISTICS

A. Anoxic Zone Mixers:

1. Dimensions:
 - a. 12-1/2 feet long.
 - b. 6-1/2 feet wide.
 - c. 15 feet deep.
2. Number of Mixers: Three.
 - a. Location: Anoxic Zone in Bioreactor 1, Bioreactor 2, and Bioreactor 3.
 - b. Service: Mixed Liquor.
 - c. Velocity Jet Ring: No.
 - d. Motor: 1.5 hp.
 - e. Composite Cable: 25 feet long.
 - f. Motor: With thermal sensors and leak detection sensors.
 - g. Materials: Standard.

B. Post Anoxic Zone Mixers:

1. Dimensions:
 - a. 12-1/2 feet long.
 - b. 14-1/4 feet wide.
 - c. 15 feet deep.
2. Number of Mixers: Three.
 - a. Location: Post-Anoxic Zone in Bioreactor 1, Bioreactor 2, and Bioreactor 3.
 - b. Service: Mixed Liquor.
 - c. Velocity Jet Ring: No.
 - d. Motor: 1.5 hp.
 - e. Composite Cable: 25 feet long.
 - f. Motor: With thermal sensors and leak detection sensors.
 - g. Materials: Standard.

C. Mast Assembly for Submersible Mixers:

1. Mast: 316L stainless steel.
2. Upper Support: 316L stainless steel.
3. Intermediate Support: Wall mounted and 316L stainless steel.

4. Lower Support: Wall mounted and 316L stainless steel.
5. Quantity: Six masts with all appurtenances.

D. Davit Assembly:

1. Feature: Mast-mounted.
2. Material: 316L Stainless steel.
3. Quantity: Six.
4. Location: Where shown on the Drawings.

2.04 FUNCTIONAL CHARACTERISTICS

- A. Mix mixed liquor suspended solids in zones indicated on the Drawings.

2.05 PERFORMANCE CHARACTERISTICS

- A. Provide adequate mixing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide 316L stainless steel mounting bolts, washers, and nuts and install the equipment at locations indicated on the Drawings.
- B. Install the equipment in accordance with the manufacturer's instructions and typical installation detail included in this section.

3.02 FIELD TESTING AND FACILITY STARTUP

- A. Field Testing and Facility Startup shall be in accordance with the requirements of Section 01 91 14, Equipment Testing and Facility Startup.
- B. Facility startup specifies the order and prerequisites for the following tests of the equipment:
1. Field functional testing.
 2. Software operational testing.
 3. Performance testing.
 4. Demonstration testing.
- C. All Field Testing and Facility Startup shall be performed using a qualified representative provided by the Manufacturer as specified in Section 01 91 14, Equipment Testing and Facility Startup, Section 01 43 33, Manufacturers' Field Services, and as elaborated upon in this section.

3.03 TESTING

- A. The final acceptance of the equipment requires a field test for handling the specified fluid under specified conditions.
- B. Furnish for each unit, certified performance curves that show efficiency, speed range, brake horsepower, at no extra charge.
- C. Make available to the Government without charge, all test records, whether test witnessing is required or not on the Data Sheet.
- D. Mixing Test to demonstrate adequate mixing:
 - 1. Select three vertical lines and two depths in one anoxic zone and one post anoxic zone (may be within the same bioreactor, subject to Contracting Officer approval) when MLSS is between 2,000 and 7,000 mg/L.
 - 2. Take three Samples at each of two depths along each vertical line using Van Dorn or Kemmerer sampler.
 - 3. Independent testing laboratory approved by the Contracting Officer shall perform total suspended solids (TSS) test on each Sample. Mean value of TSS for three Samples at each depth will be used to determine conformance with requirements.
 - 4. Testing and sampling shall conform to procedures established in latest edition of Standard Methods for Examination of Water and Wastewater.

3.04 START-UP

- A. Before operating equipment, provide the services of a qualified manufacturer's service representative to inspect, operate, test, and adjust the equipment after installation.
- B. Submit the manufacturer's representative's signed report describing in detail the inspection, tests and adjustments made, quantitative results and suggestions for precautions to be taken to ensure proper maintenance. The report must verify that the equipment conforms to the requirements of the Contract for the service intended and is ready for permanent operation. Provide copies of this report to be included in the installation, operation and maintenance manuals.
- C. Included in the Inspection:
 - 1. Soundness (without cracked or otherwise damaged parts).
 - 2. Completeness of installation as specified and as recommended by manufacturer.
 - 3. Correctness of setting, alignment, and relative arrangement of various parts of system.

- D. Operate, test, and adjust equipment to prove that it is satisfactorily installed to operate under the intended conditions as specified.
- E. Equipment will only be accepted after receipt of the manufacturer's representative's report.
- F. Provide notice in writing at least 48 hours before manufacturer's representative is scheduled to perform these activities.
- G. Modify or replace equipment or materials failing required tests.
- H. Perform additional testing required due to changes of materials required by Supplier or as a result of failure of materials or construction to meet specifications.
- I. Unconditionally guarantee the equipment to meet or exceed the design criteria detailed in this specification.

END OF SECTION