# Utility Engineering Consultants, *LLC*

Phone : 205.951.3838
FAX : 205.951.3839
WEB : www.uecllc.com

130 Southcrest Drive, Suite 100
Homewood, AL 35209
P.O. Box 19218
Birmingham, Alabama 35219


**December 10, 2021**

**City of Marion**
**123 E. Jefferson Street**
**Marion, Al 36756**

**Re: CITY OF MARION**
**MARION WATER TREATMENT PLANT EMERGENCY PROJECT**

**ADDENDUM NO. 3**

The changes, modifications and/or additions covered by and set forth in this Addendum No.3 shall become part of and be incorporated in the Specifications, Contract Documents and Bid Documents for the above referenced project.

**CLARIFICATION**

- The Instrumentation/Telemetry Company is Control Systems, Inc. (CSI) - Contact Person is James Mason (205) 679-4000.

**SPECIFICATIONS AND CONTRACT DOCUMENTS**

- Replace Section 00410 Bid Form/Proposal Form with the attached Section 00410 Bid/Proposal Form.
- Section 11384 shall be added to become part of the Specifications.
- Section 11385shall be added to become part of the Specifications.
- Section 15070 shall be added to become part of the Specifications.
- Replace Section 15100 Part 2 – Products - Division 2.18; to become part of the Specifications.
- Replace Section 15100 Part 3 – Schedule - Division 3.2; to become part of the Specifications.

This Addendum No. 3 shall be made a part of your set of Construction Contract Documents and Specifications. Acknowledgment of receipt of Addendum No. 3 shall be noted in Section 00410 Bid Form.

**UTILITY ENGINEERING CONSULTANTS, LLC**

Roderick A. Hawkins

RAH/db

**ADDENDUM NO. 3**

**SECTION 00410**

**BID FORM**

**TABLE OF ARTICLES**


| Article | Article No. |
|---|---|
| Bid Recipient. | 1 |
| Bidder's Acknowledgments. | 2 |
| Bidders' Representations. | 3 |
| Further Representations. | 4 |
| Basis of Bid. | 5 |
| Time of Completion. | 6 |
| Attachments to this Bid. | 7 |
| Defined Terms. | 8 |
| Bid Submittal. | 9 |

**BID FORM**

**ARTICLE 1 - BID RECIPIENT**

1.01 This Bid is submitted to:

City of Marion

123 E. Jefferson Street, Marion, Al 36756

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 - BIDDER'S ACKNOWLEDGMENTS**

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3 - BIDDER'S REPRESENTATIONS**

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

| Addendum No. | Addendum Date |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident

thereto.

E. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

F. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

G. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

J. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

**ARTICLE 4 - FURTHER REPRESENTATIONS**

4.01 Bidder further represents that:

A. this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

**ARTICLE 5 - BASIS OF BID**

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

**ADDENDUM NO. 3**
**PROPOSAL FORM**

## CITY OF MARION, ALABAMA

### MARION WATER TREATMENT PLANT EMERGENCY UPGRADES

### CONTRACT NO. MA 21 081

**Contractor's Name** _____ **License #**_____

## BASE BID

| Item No. | Description | Estimated Quantity | Bid Unit Price | Bid Price |
|---|---|---|---|---|
| 1. | Provide Interior Piping Modifications inside the existing Pipe Gallery of the WTP Building; Yard Piping; Remove and Replace existing Valves (Installation of New Filter Valves). Furnish and Install Per LS | 1 LS | | |
| 2. | Remove and Replace Blowers on Existing Aerator Furnish and Install Per LS | 1 LS | | |
| | **TOTAL BASE BID AMOUNT** | | | |

**TOTAL AMOUNT OF BASE BID IN WRITTEN FORM:**

**ADDENDUM NO. 3**
**PROPOSAL FORM**

## CITY OF MARION, ALABAMA

**MARION WATER TREATMENT PLANT EMERGENCY UPGRADES**

**CONTRACT NO. MA 21 081**

**Contractor's Name** _____ **License #**_____

## ADDITIVE ALTERNATE 1

| Item No. | Description | Estimated Quantity | Bid Unit Price | Bid Price |
|---|---|---|---|---|
| 1. | Furnish and Install the Flocculator Mixer Assemblage. Complete w/Motors. Mixer, Paddles. Disconnect panels, required electrical, etc) Furnish and Install Per EA | 4 EA | | |
| 2. | Furnish and Install the Flash Mixer Assemblage. Complete w/motors. mixer, paddles. Disconnect panels, required electrical, etc Furnish and Install Per EA | 1 EA | | |
| | **TOTAL ADDITIVE ALTERNATE 1 AMOUNT** | | | |

**TOTAL AMOUNT OF ADDITIVE ALTERNATE 1 BID IN WRITTEN FORM:**

**ADDENDUM NO 3**
**PROPOSAL FORM**

**CITY OF MARION, ALABAMA**

**MARION WATER TREATMENT PLANT EMERGENCY UPGRADES**

**CONTRACT NO. MA 21 081**

**Contractor's Name** _____ **License #**_____

## ADDITIVE ALTERNATE 2

| Item No. | Description | Estimated Quantity | Bid Unit Price | Bid Price |
|---|---|---|---|---|
| 1. | Demolition and proper abandonment of the existing Surge Tank; Install One (1) New Surge Valve; Valve Vault and Core into Pump Well Sidewall Furnish and Install<br>Per LS | 1 LS | | |
| 2. | Demolition and Proper Abandonment of the existing Diesel Fuel Tank next to the Pump Building. Furnish and Install<br>Per TON | 200 TON | | |
| | **TOTAL ADDITIVE ALTERNATE 2 AMOUNT** | | | |

**TOTAL AMOUNT OF ADDITIVE ALTERNATE 2 BID IN WRITTEN FORM:**

**ADDENDUM NO 3**
**PROPOSAL FORM**

## CITY OF MARION, ALABAMA

**MARION WATER TREATMENT PLANT EMERGENCY UPGRADES**

**CONTRACT NO. MA 21 081**

**Contractor's Name** _____ **License #**_____

## ADDITIVE ALTERNATE 3

| Item No. | Description | Estimated Quantitiy | Bid Unit Price | Bid Price |
|---|---|---|---|---|
| 1. | Installation of New Raw Water Meter, New Finished Water Meter and Meter Vault Accordance with Plans and Specs, (Division 15) Furnish and Install Per LS | 1 LS | | |
| | | | TOTAL ADDITIVE ALTERNATE 3 AMOUNT | |
| **TOTAL AMOUNT OF ADDITIVE ALTERNATE 3 BID IN WRITTEN FORM:** | | | | |

| | | |
|---|---|---|
| | TOTAL OF BASE BID | |
| | TOTAL OF ADDITIVE ALTERNATE 1 | |
| | TOTAL OF ADDITIVE ALTERNATE 2 | |
| | TOTAL OF ADDITIVE ALTERNATE 3 | |
| | TOTAL OF ALL BIDS | |
| **TOTAL AMOUNT OF ALL BIDS IN WRITTEN FORM:** | | |

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

**ARTICLE 6 - TIME OF COMPLETION**

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Times.

**ARTICLE 7 - ATTACHMENTS TO THIS BID**

7.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of Bid Bond or check

B. List of Proposed Subcontractors

C. List of Proposed Suppliers

D. List of Project References

E. Required Bidder Qualification Statement with Supporting Data

F. Affidavit of Non-Collusion

G. Bid Bond

**ARTICLE 8 - DEFINED TERMS**

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

**ARTICLE 9 - BID SUBMITTAL**

9.01 This Bid submitted by: _____

If Bidder is: _____

An Individual

Name (typed or printed): _____

By: _____

(SEAL)

(*Individual's signature)*

Doing business as: _____

A Partnership

Partnership Name: _____
(SEAL)

By: _____
*(Signature of general partner — attach evidence of authority to sign)*

Name (typed or printed): _____

A Corporation

Corporation Name: _____
(SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____
*(Signature — attach evidence of authority to sign)*

Name (typed or printed): _____

Title: _____
(CORPORATE SEAL)

Attest _____

Date of Authorization to do business in *Alabama* is _____/_____/_____.

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____
(SEAL)

By: _____
*(Signature of first joint venturer partner — attach evidence of authority to sign)*

Name (typed or printed): _____

Title _____

Second Joint Venturer Name: _____
(SEAL)

By: _____
*(Signature of second joint venturer partner — attach evidence of authority to sign)*

Name (typed or printed): _____

Title: _____
(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

All Bidder's
Business Address _____

Phone No. _____ Fax No. _____

SUBMITTED on _____, 20____

State Contractor License No. _____

**ADDENDUM NO. 3**

**SECTION 11384**

**RAPID MIX BOX AGITATORS**

## PART 1 - GENERAL

### 1.1 SCOPE

This specification describes the electrical, mechanical and process requirements for providing one (1) agitator(s) complete with motor, speed reducer, shaft and impeller(s) for installation in a rapid mix box. All components of the mixers shall be furnished by one manufacturer.

### 1.2 RELATED SECTIONS

A. Section 09900 - Field Painting

B. Section 13401 - Instrumentation

C. Section 15170 - Motors

D. Section 167346 - Electrical

### 1.3 CODES AND STANDARDS

A. AFBMA Anti-Friction Bearing Manufacturer's Association

B. AGMA American Gear Manufacturer's Association
   1) AGMA 390.03 - Gear Handbook Volume 1 - Gear classification, Materials and Measuring Methods for Unassembled Gears.
   2) AGMA 299.01 Sound Manual
   3) AGMA 6010.E88 - Spur, Helical, Herringbone and Bevel Endorsed Drives

C. ANSI American National Standards Institute

D. NEMA National Electrical Manufacturer's Association

E. OSHA Occupational Safety and Health Administration Code of Federal Regulations (CFR 29)

F. SSPC Steel Structures Painting Council

### 1.4 SUBMITTALS

A. Product Data

B. Shop Drawings

C. Quality Control

D. Warrantee

E. Operation and Maintenance Manuals

F. Submit under provisions of Section 01300.

## 1.5 QUALITY ASSURANCE

A. The agitator vendor shall be regularly engaged in the business of designing and manufacturing agitators for a period in excess of ten (10) years.

B. To ensure system responsibility, the equipment manufacturer must design, manufacture, test and warrantee the agitator reducer, shaft and impeller(s).

C. All components shall be standard products and construction.

D. The equipment manufacturer shall have a written Quality Assurance Manual and shall have an implemented Quality Assurance program.

## 1.6 SYSTEM DESCRIPTION

| | Rapid Mix Box |
|---|---|
| A. Basin Dimensions | |
| 1. Length | 7'-0" |
| 2. Width | 7'-0" |
| 3. Straight Side | |
| 4. Top | Open<br>Flat<br>348.00 feet elevation |
| 5. Bottom | Flat<br>337.00 feet elevation |
| 6. Over-all Height | 11.0 feet |
| 7. Side Water Depth | 8.5 feet |
| B. System Flow Rates (if applicable) | |
| 1. Design Flow Rate | 3.0 MGD |
| 2. Maximum Flow Rate | 2.0 MGD |
| 3. Minimum Flow Rate | 0.75 MGD |
| C. Baffles | |
| 1. Quantity | 1 |
| 2. Width | 5' 5 inches |
| 3. Length | 10.2 feet |
| 4. Off wall | 2' 0 inches |

## 1.7 PERFORMANCE REQUIREMENTS

A. Motor Horsepower

B. Velocity Gradient

C. Impeller Tip Speed

D. Chem Scale

E. Uniformity

F. Torque per 1,000 gallons

G. Primary Pumping Capacity

H. Impeller Diameter/Tank Diameter

## 1.8 SPARE PARTS

A. Furnish any and all spare parts required for one (1) full year of operation.

B. Furnish any and all special tools are required to install, adjust, maintain, or operate the equipment supplied.

## 1.9 COORDINATION

Contractor to coordinate equipment compatibility with basin geometry, mounting structure, and power requirements, including mounting elevation, starters, controls and VFD's.

## 1.10 SCHEDULE REQUIREMENTS

Contractor to coordinate scheduling requirements.

# PART 2 - PRODUCTS

## 2.1 GENERAL

A. The pre and post flash mixers shall be the standard products of manufacturers who regularly engage in the production of this type of equipment and who are fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed, delivered new and unused, and the product of a manufacturer having a successful record of operation, manufacturing and servicing the equipment for a minimum of five (5) years. Manufacturer shall supply Engineer with previous installation details. Both mixers shall be supplied by the same manufacturer.

B. Mixing performance is dependent upon achieving good contact for particle growth at minimum shear levels with high flows. Each equipment supplier must produce process data indicating he has studied the mixing process and has adequate full scale competence to design this equipment. The equipment supplier must provide an impeller with essentially a constant velocity across its profile to insure no excessive floc shearing. He must submit certified test data on a geometrically similar impeller producing the same flow characteristics which verifies the relative velocity across the profile of the flow. The average velocity at any point from twenty-five (25) percent of the radius to ninety (90) percent of the radius may not vary more than ± twenty (20) percent. If certified test data has not already been obtained, a full scale test on the impeller being provided must be run, yielding at least twenty (20) data points. The result of the full scale test must meet the velocity constraints listed above. The Engineer must approve the method of data collection and analysis as well as the results as part of the approval requirements.

## 2.2 MANUFACTURE(S)

A. ANCO Mixers

B. Chemineer, Inc.

C. MIXTECH

D. Phidelphia Mixers

E. Or ENGINEER APPROVED equal

## 2.2 EQUIPMENT

A. Drive Assembly
   1. The speed reducer drive shall be a right angle gear drive with helical and spiral bevel gearing. Worm gear drives, all helical gear drives and belt drives are not allowed. Gear drives must be double or triple reduction, with a maximum gear ratio at 7:1.
   2. The speed reducer shall be designed, manufactured, tested and warranted by the equipment manufacturer.
   3. The reducer shall have a solid OVERSIZED output shaft which is larger in diameter than the impeller shaft.
   4. The equipment manufacturer shall be a member of AGMA, and the reducer shall bear an AGMA nameplate.
   5. The gear drive shall be suitable for operation under the following conditions.
      a. Suitable for 24 hour per day continuous operation under (light, moderate or heavy) shock load.
      b. Outdoor (or indoor) environment.
      c. Ambient temperatures from 85°F to 45°F.
      d. Elevation 780.0 feet above seal level.
   6. The thermal rating shall exceed the mechanical rating of the reducer at the design speed. External cooling devices are not allowed.
   7. The AGMA service factor, based on motor nameplate horsepower and design speed, shall be 1.5 or greater.
   8. All bearings, including the output shaft bearings, shall have a minimum AFBMA L-10 life of 100,000 hours. The output shaft bearings shall have a minimum AFBMA L-10 bearing life of 200,000 hours.
   9. The speed reducer shall be designed with a dry well construction to prevent oil leakage down the output shaft.
   10. General maintenance of the reducer shall not require the removal of the reducer housing from its foundation, or the removal of the motor from the base.
   11. A single oil drain shall be provided at the low point of the reducer to allow for drainage. The drain shall be accessible from both the bottom and side of the reducer.
   12. A dipstick or sight glass shall be provided to observe oil levels.
   13. The motor shall be coupled to the reducer input shaft with a Wood's Sureflex coupling. Falk Steelfax coupling, or equal.
   14. All rotating shafts above the motor mounting surface shall be provided with guards, per OSHA requirements.
   15. Lubrication shall by fail safe splash lubrication, or pumped oil lubrication, suitable for all weather starting and operation. Pumped systems shall have an external filter, pressure and/or flow switch to prevent operation with low oil level or pump failure.

a. Motor

| | | |
|---|---|---|
| 1) | Horsepower | 5.0 HP |
| 2) | Maximum motor speed | 1800 RPM/Dual 1800/1200 RPM |
| 3) | Efficiency | Premium/High/Standard |
| 4) | Voltage | 575/460/230/115 |
| 5) | Hertz | 60/50/0-60 |
| 6) | Phase | 3/1 |
| 7) | Class Insulation | B/F |
| 8) | Temperature Rise | B rise at 1.15 service factor |
| 9) | Duty | Continuous/Severe/Chemical/VFD/EXP |
| 10) | Enclosure | TEFC/TENV |
| 11) | Ambient Temperature | 40°C/50°C |
| 12) | Torque | NEMA B/NEMA C |
| 13) | Service Factor | 1.0/1.15 |

b. Mounting Configuration
   1) As shown on the Plans

c. Impeller Shaft
   1) Furnished with a rigid coupling located immediately below the speed reducer to allow easy removal of the impeller shaft without disturbing the speed reducer.
   2) The impeller shaft shall be designed such that the maximum combined stress is less than 8,000 PSI. The calculation of combined stress shall include both torsional and bending loads.
   3) Shafts shall be manufactured or turned, ground and polished or annealed and centerless ground bar which is straightened to within 0.003 inches TIR per foot of length.
   4) Material of construction shall be 316(L)SS.
   5) The shaft rotational speed shall not be greater than 80 percent of the first lateral natural frequency (critical speed) of the shaft with stabilizers, or 65 percent without stabilizers for standard efficiency impellers.
      a) The shaft rotation at speed shall not be greater than 80 percent of the first lateral natural frequency (critical speed) of the shaft with or without stabilizers for high efficiency impellers.
   6) Furnish shaft with a keyway and hook key. Impeller location to be adjustable 18 inches upwards in 3 inch increments.
   7) Impeller shaft length shall be per manufacturer's recommendation.

d. Impeller(s)
   1) The impeller hub and blades shall be designed such that the maximum combined stress in any component is less than 11,000 PSI.
   2) Material of construction shall be 316(L)SS.
   3) Impeller type(s) shall be:
      a) Axial flow P-4 impeller with 4 blades pitched at 45 degree angle and attached to a central hub.
   4) Impeller(s) shall be adjustable with hook key.

## 2.3 FACTORY FINISHING

A. Preparation
   1. All external carbon steel surfaces to be painted must be clean and free of all rust, mill scale, surface oil, grease, weld spatter, weld slag, weld ash and heat distortion. Compressed air abrasive cleaning is the preferred method of cleaning. Power tool cleaning followed by a thorough solvent wash is allowed.

2. All external surfaces must be free of oil, grease and grime. All metal and previously painted surfaces are washed using Xylene lacquer thinner or Cleaner 610 (Safety Clean).

B. Pretreatment
   1. The gearcase fabrication is to be sealed inside and out using Sherwin-Williams 2.8 VOC Catalyzed Primer.
   2. Primer: Sherwin-Williams 2.8 VOC Catalyzed Primer. Mix 4 parts E51A280 (Part A), 1 part VG6V282 (Part B) and 0.75 parts R&K3010 Reducer (Part C). This lead free primer provides excellent adhesion to cast iron and carbon steel. May be top coated with all Chemineer standard primers and top coats.
   3. Apply 1 to 2 mils Dry Film Thickness (DFT), one coat.

C. Dry Film Thickness (DFT)
   1. The DFT is 2 to 3 mils primer and 2 to 3 mils top coat for a total DFT of 4 to 6 mils.
   2. For thin sheet metal and expanded metal guards the DFT is 1 to 1.5 mils primer and 1 to 1.5 mils top coat for a total DFT of 2 to 3 mils.

D. Paint
   1. Primer: Sherwin-Williams 2.8 VOC Catalyzed primer. Mix 4 parts E61A280 (Part A), 1 part VG6V282 (Part B) and 0.75 parts RK33010 Reducer (Part C). Apply 1 to 2 mils per coat using conventional air spray systems.
   2. Top Coat: Sherwin-Williams Polane HS Plus Polyurethane Enamel, F63-SW4064, Turbine Blue (Z99LS89-460A), 80% gloss. Mix 2 parts paint, 1 part V66V55 catalyst and 0.6 parts Reducer RGK301D. Apply 1 to 1.5 mils DFT per coat using conventional air spray systems.

## PART 3 - EXECUTION

### 3.1 DELIVERY, STORAGE AND HANDLING

Deliver, store and handle products as recommended by the equipment manufacturer.

### 3.2 INSTALLATION

A. Install in accordance with the equipment manufacturer's recommendations.

B. Lubricate moving parts as recommended by the manufacturer's written recommendations.

C. Make sure that each mixer is securely anchored.

### 3.3 SERVICE

The equipment manufacturer shall furnish the services of a qualified field representative to check the equipment installation, to supervise start-up, and to instruct operating personnel in the proper maintenance and operation of the equipment. The field representative shall be available for a minimum of two (2) trips of not more than two (2) days per trip at no additional cost to the Owner.

### 3.4 INSPECTION AND TESTING

After completion of installation, the equipment shall be tested by the contractor under actual operating conditions. The tests shall demonstrate that the system and individual components operate properly , and in accordance with all requirements of the specification.

## 3.5 OPERATION AND MAINTENANCE DATA

Three (3) copies of an operation and maintenance manual shall be provided to the Owner. The instructions shall be prepared specifically for the installation and shall include start-up data, trouble shooting guides, routine maintenance procedure, lubrication data, drawings, equipment lists, and descriptions that are required to instruct the operating personnel.

## 3.6 GUARANTEE

The contractor shall submit a written guarantee of all materials and workmanship of equipment furnished and installed under this specification for a period of one (1) year from the date of the Owner's acceptance, or start-up.

**ADDENDUM NO. 3**

**SECTION 11385**

**VERTICAL SHAFT TURBINE FLOCCULATORS**

**PART 1 - GENERAL**

## 1.1 SCOPE OF WORK

A. The Contractor shall furnish and install ready for use, two (2) heavy duty vertical shaft turbine flocculators including all necessary appurtenances for the complete assembly as indicated on the Plans and as specified herein.

B. The mixer shall be a complete assembly including, but not limited to, the gear reducer, motor, shafting, impeller, couplings, mounting base and other appurtenant equipment necessary to be complete and operable in accordance with the requirements of the contract documents.

## 1.2 REFERENCED STANDARDS

A. AFBMA - Anti-Friction Bearing Manufacturers Association

B. AGMA - American Gear Manufacturers Association
   1. AGMA 390.08 - Gear Handbook Volume 1: Gear Classification, Materials and Measuring Methods for Unassembled Gears.
   2. AGMA 299.01 - Sound Manual.
   3. AGMA 6010.E88 - Spur, Helical, Herringbone and Bevel Enclosed Drives

C. ANSI - American National Standards Institute

D. ASTM - American Society for Testing and Materials

E. NEMA - National Electrical Manufacturers Association

F. OSHA - Occupational Safety and Health Administration, Code of Federal Regulations, (CFR 29)

## 1.3 QUALITY ASSURANCE

A. Each Mixer shall be completely shop assembled and factory tested to assure proper fit-up, and acceptable limits of vibration, shaft run out and motor power draw. The equipment shall then be packaged for shipment and jobsite storage to prevent damage or corrosion.

B. The equipment seller shall be solely and fully responsible for warranty and mechanical design adequacy of all the provided under this section of the specification.

## 1.4 SUBMITTALS

A. Copies of all materials to establish compliance with the specifications shall be submitted in accordance with the provisions as outlined. Submittals shall include at least the following:
   1. Complete description of all materials.

2. Drawings showing complete dimensional data of the proposed mixer design including the mixer outline dimensions, mixer drive, output coupling, and impeller assembly data and mounting details.
3. A complete bill of materials.
4. The weight of the complete mixer assembly and each component; motor, gearbox, shafting and impellers.
5. Description of surface preparation, shop priming and finish painting of the mixer.
6. Mixer design calculations and process design calculations.
7. Complete motor data.
8. Mixer installation, operation and maintenance information.

## 1.5 OPERATION AND MAINTENANCE DATA

Operating and maintenance instructions shall be furnished per the instructions included in the specification. The instructions shall be prepared specifically for this installation and shall include start-up data, trouble shooting guides, routine maintenance procedures, lubrication data, drawings, equipment lists, descriptions, etc. that are required to instruct operating personnel.

## 1.6 DELIVERY, STORAGE AND HANDLING

All materials and equipment shall be shipped, stored, handled and installed in such a manner as to not to degrade quality, serviceability or appearance. The equipment shall be stored in a clean, dry location free from construction dust, precipitation and excess moisture. If stored for more than two weeks, the equipment shall receive all maintenance considerations required by the manufacturer for proper storage of the equipment.

## 1.7 TOOLS AND SPARE PARTS

A. Furnish one set of all special tools required for the proper servicing of all equipment supplied under these specifications.

B. Furnish all spare parts not including required lubrication as recommended by the manufacturer for one year's normal operation and maintenance of the equipment.

# PART 2 - PRODUCTS

## 2.1 GENERAL

A. The equipment herein specified is intended to be standard mixing equipment of proven ability as manufactured by reputable concerns having experience in the production of such equipment. The equipment shall be designed, constructed and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed as shown on the drawings.

B. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be especially adapted for the work to be done.

C. The drive assembly shall be VFD.

## 2.2 MANUFACTURERS

A. ANCO Mixers

B. Chemineer, Inc.

C. MIXTECH

D. Phidelphia Mixers

E. Or ENGINEER APPROVED equal

## 2.3 MATERIALS

All submerged parts including the mixer shaft and impeller shall be constructed of type 316 stainless steel. All fasteners required for assembly of submerged parts shall be type 316 stainless steel.

## 2.4 DESIGN CRITERIA

A. See Plans and Flow Design in Rapid Mix Specifications.

## 2.5 DRIVE ASSEMBLY

A. The mixer drive consisting of a speed reducer and motor shall be factory mounted to a common open type factory manufactured extended pedestal base that provides access to the low speed impeller shaft coupling above the mounting platform. The base shall be made from ASTM A36 carbon steel.

B. The speed reducer shall be either a parallel shaft, all helical gear design or right angle helical-spiral bevel gear design. Worm gear drives are not acceptable. The gearbox shall be suitable for AGMA Class II, 24-hour continuous service under moderate shock conditions in an outdoor environment. The reducer case is to be manufactured of high strength grey cast iron, SAE Class 30. The gears shall be carburized to a hardness of 58-62 Rockwell C, and finish ground to a minimum AGMA Class 10 quality level to assure minimum backlash, noise, heat and a minimum 95 percent gearbox efficiency.

C. The speed reducer shall be provided with a suitable lubrication system for all-weather starting and operation of the unit. A dipstick or sight glass shall be provided to observe oil levels. All fill and drain lines shall be sized for efficient functioning, and located for easy access. Oil changes, following the initial run-in period, shall not be required at less than 8,000 hour intervals. The low speed shaft shall be provided with an internal synthetic, spring loaded double lip seal. Dual external spring loaded double lip seals and a dry cavity between the seals which shall contain the lower grease lubricated output shaft bearings. The speed reducer breather shall be located above possible oil foam level. Other forms of lubrication, such as greasing of certain working parts within the speed reducer, are permissible provided adequate separation is made of these parts from oil lubricated parts. General maintenance, specifically including motor changes, and oil system maintenance including oil changes, shall not require the removal of the speed reducer from its foundation. The speed reducer shall be provided with lifting lugs suitable for lifting the complete mixing unit.

D. Mixer drive gearbox bearings shall be designed for a minimum rated $L_{10}$ life of 100,000 hours, with the output bearings rated for 150,000 hours.

E. The thermal rating of the speed reducer shall exceed the mechanical rating to eliminate the need for external coolers.

F. The speed reducer shall have a minimum service factor based on the motor nameplate horsepower rating of 1.5 for the flocculators.

G. The full load operating noise level of the gear reducer shall meet the more stringent requirements of current OSHA occupational noise standards or AGMA 299.01, and shall not exceed 85 dBA at a distance of three feet from any part of the drive assembly.

## 2.6 MOTOR

A. The mixer drive motor shall be severe duty, high efficiency, totally enclosed fan cooled cast iron construction designed for operation with a variable frequency drive. The motor shall be designed for continuous operation in a 40°C ambient temperature environment with the horsepower ratings and speeds specified. The motors shall be nameplated for inverter duty 1.0 service factor and have a Class F insulation rating.

B. Motors shall have the following characteristics in addition to those described herein:

| | |
|---|---|
| Enclosure | TEFC |
| Nominal synchronous (60 hertz speed) | 1,800 RPM |
| Voltage | 230/460 volts |
| Phase | 3 |
| Nominal frequency | 60 hertz |

## 2.7 LOW SPEED COUPLING

A. A flanged coupling assembly shall be used for connecting the gearbox output shaft and the vertical impeller shaft. The upper coupling half shall be keyed on the speed reducer output shaft and shall be held in place by a retainer washer and bolt in the end of the gearbox output shaft. The lower mixer shaft coupling half shall be welded to the mixer shaft.

B. The coupling halves shall be either cast or machined from solid round bar of the wetted material specified. The couplings shall be turned and faced to provide a precision machined register fit. The coupling assembly shall be designed to transmit 200 percent of the full torque and 150 percent of the axial load on the coupling.

C. The coupling halves shall be bolted together through the flanges with plated bolts. The Contractor shall submit with the shop drawings details of the coupling-shaft sleeve arrangement for the Engineers review and acceptance.

## 2.8 IMPELLER SHAFT

The impeller shaft shall be solid annealed, centerless ground bar sized so the maximum operating speed of the impeller and shaft assembly does not exceed 40% of the first natural critical speed. The weight of both the shaft and the impeller assembly shall be taken into account in calculating the critical speed. The shaft diameter shall be determined by an analysis of shaft stresses caused by torque and bending moments as well as critical speed but shall in no case be less than indicated herein. The combined shaft stress shall not exceed 8,000 psi. The mixer shaft shall be straightened to within ⅛ inch for every ten (10) feet of length.

## 2.9 INPELLER ASSEMBLY

A. The axial flow impeller shall be a low profile configuration designed specifically for flocculation. The assembly shall be made up of an impeller hub with bolt on blades. Axial flow impellers shall have a hub with not less than four (4) blades evenly spaced on the hub having a minimum outside diameter specified herein. All mill scale, rust, and contaminants shall be removed. Sharp corners,

cuts or sheared edges shall be dulled by a power grinder or file.

B. The assembled impeller shall be attached to the shaft using a hook-key design to transmit the torque and support the weight of the impeller. The design of the hook-key feature shall be such that with the impeller hub set screw loosened, the impeller cannot slide down the impeller shaft during installation.

## PART 3 - EXECUTION

### 3.1 FACTORY TESTING

The flocculator mixers shall be fully assembled at the factory to insure proper fit-up of all components, and then operated to check for noise and vibration. Each size flocculator shall undergo a full load test with results recorded verifying motor amperage draw, vibration and noise levels. This test shall be witnessed by a representative of the district or its engineer, or a written release must be obtained stating that the testing does not need to be witnessed.

### 3.2 INSTALLATION

Install in accordance with the manufacturers written instructions and as approved.

### 3.3 FIELD INSPECTION AND TESTING

After completion of installation, the equipment shall be tested by the Contractor under actual operating conditions. The tests shall demonstrate that the system and individual equipment items operate properly and in all other respects fulfills its function properly and meets all requirements of the specifications.

**ADDENDUM NO. 3**

**SECTION 15070**

**SURGE RELIEF VALVE**

**PART 1 - GENERAL**

## 1.1 DESCRIPTION

A. Scope

The Contractor shall furnish and install, as shown on the Plans and specified herein, two (2) surge relief valves. The valve shall be capable of operation under full system pressure and shall open in the event that the line pressure exceeds the pilot setting.

B. Codes, Specifications and Standards

Codes, specifications, and standards referred to by title or number shall form a part of this specification to the extent required by the references thereto. Latest revisions as of the date of bid opening shall apply, unless otherwise specified.

C. Definitions

1. Abbreviations

| | | |
|---|---|---|
| a. | AASHTO | American Association of State Highway and Transportation Officials |
| b. | ANSI | American National Standards Institute |
| c. | ASTM | American Society for Testing and Materials |
| d. | AWS | American Welding Society |
| e. | AWWA | American Water Works Association |
| f. | SSPC | Steel Structures Painting Council |
| g. | PFI | Pipe Fabricators Institute |

2. All pipe, fitting, and valve size and all references to pipe diameter on the drawings or in the specifications are intended to be nominal size or diameter, and shall be interpreted as such.

## 1.2 QUALITY ASSURANCE

A. Marking

Valve marking shall meet the requirements of the applicable specification or standard.

B. Testing

1. Perform factory tests in accordance with the applicable specification or standard.
2. Perform field tests specified in this section.

C. Disinfection

Disinfect finished water piping constructed under this contract. Collect and submit samples of water from the potable water piping. Collect samples after the piping has been disinfected. Submit the samples to the applicable regulatory agency for bacteriological analysis. Collection and submittal of these samples shall meet the requirements of the applicable regulatory agency.

## 1.3 SUBMITTALS

A. Submit Shop Drawings under provisions of Section 1300.

B. Submit the following:
   1. Manufacturer's Certificate of Compliance certifying compliance with the applicable specifications and standards.
   2. Shop drawings with performance data and physical characteristics for valves and with dimensioned layouts of piping.
   3. Manufacturer's written installation instructions for valves.
   4. Manufacturer's operation and maintenance material and manuals for valves.

## 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall be responsible for the delivery, storage, and handling of products.

B. Load and unload all valves, and appurtenances by hoists or skidding. Do not drop products. Do not skid or roll products on or against other products. Use sling, hooks, and pipe tongs in such a manner to prevent damage to products. No inward projecting lifting device shall be allowed.

C. Keep stored products safe from damage or deterioration. Keep the interior of valves, and appurtenances free from dirt or foreign matter. Drain and store valves in a manner that will protect valves from damage. Store gaskets, and other products which will be deteriorated by sunlight in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products.

D. Store valves and appurtenances in accordance with manufacturer's recommendations.

E. Promptly remove damaged products from the job site. Replace damaged products with undamaged products.

# PART 2 - PRODUCTS

## 2.1 GENERAL CONSTRUCTION

A. The surge relief valve shall be pilot operated, and shall be capable of rapid opening when the line pressure exceeds the setting of its pilot valve. The valve shall be Class 150 flanged, angle body type, and shall be fully bronze mounted. An external pilot operator shall be provided to sense line pressure and control the operation of the main valve cylinder. The valve will be equipped with a free floating piston (operated without springs, diaphragms, or levers), and shall have a single seat bore equal to the size of valve.

B. The minimum travel of the piston will be equal to 25% of the diameter of the seat. For true alignment and to correct for lateral thrust and stem binding, the piston shall be guided above and below the seat a distance equal to no less than 75% of the diameter of the seat. The piston shall be cushioned and so designed as to insure positive closure.

C. The valve will be packed with leather (or other soft material) to insure tight closure and to prevent metal to metal friction and seating. An indicator rod shall be furnished on the top of the valve to show position of the piston. Pet-cocks shall be provided on the valve body for attachment of gauges.

D. The pilot valve shall be easily accessible and shall be arranged to allow for its removal from the main valve while the main valve is under pressure. The pilot valve shall be of all-bronze construction with steel springs and rubber o-rings. Diaphragm shall also be of bronze construction, with a monel stem. An adjusting screw shall be provided on the top of the pilot valve for field adjustment of the relief pressure.

E. Needle valves shall be provided to control the opening speed of the valve. A bronze external strainer shall be provided, with a stainless steel screen and manual blow off vent, to protect the pilot and speed control valves. All pilot piping shall be brass or bronze, with threaded connections.

F. The design of the surge relief valve shall be such that repairs and dismantling of the main valve internals may be made without its removal from the line.

G. The 150 lbs. flanged assemblies shall conform to A.S.A. standards for flange thickness and drilling and wall thickness of body and caps. The valve casing shall be constructed of first class grey iron free from cold shuts, specification A-126 Class B. All bronze parts of the valve shall conform to ASTM specification B-62.

H. A factory pressure test shall be performed on the valve prior to shipment from the factory. This test may be witnessed by the Engineer and will simulate field conditions of operation as well as a cold hydrostatic test of at least 100% above the maximum pressure for which the valve is to operate.

I. All iron castings shall be coated on all sides with at least two coats of a rust inhibiting synthetic resin and asphaltum enamel.

J. The surge relief valve shall be manufactured by the BERMAD, ClaVal, Golden Anderson Mfg. Co. or equal.

## PART 3 - EXECUTION

### 3.1 SERVICE

A. The Contractor will include in his Bid the services of the Equipment Manufacturer's field service technician for a period of one trip and two working days. This service will be for the purpose of check-out, initial start-up, acceptance testing, certification and instruction of plant personnel.

B. A written report covering the technician's findings and installation approval shall be submitted to the Engineer, covering the inspections and outlining in detail any deficiencies noted.

**ADDENDUM NO. 3**

**SECTION 15100**

**PART 2 - PRODUCTS**

## 2.18 ELECTRIC VALVE ACTUATORS

A. Equipment Requirements:
The actuators shall be suitable for use on 480 volt 3-phase 60 Hz power supply and must include motor, reversing starters, local controls and terminals for remote control and indication housed within a self contained, sealed enclosure. Set-up of the actuator shall be carried out without the removal of any covers. Actuator calibration shall be by integral pushbuttons and selector switch. In addition, provision shall be made for the protection of configured actuator settings by means of a password.

B Actuator sizing:
The actuator shall be sized to guarantee valve closure at the specified torque and/or thrust requirement as indicated by the valve manufacturer or supplier. The actuator must be adequately sized to provide the torque required to operate the valve at 90% of the nominal voltage with the option of operation at up to -30% undervoltage conditions. The operating speed shall provide valve closing and opening at approximately 12 inches per minute for gate valves, slide or sluice gates, 4 inches per minute for globe valves and as indicated in the valve list for quarter-turn valves. Quarter-turn actuators shall be furnished with mechanical stops that restrict the valve/actuator travel.

C. Environmental
Actuators shall be suitable for indoor and outdoor use. The actuator shall be capable of functioning in an ambient temperature ranging from -13°F to +158°F (-25°C to +70°C) in open/close service and, up to 100% relative humidity.

D. Enclosure
Actuators shall be 0-ring sealed, watertight to NEMA 4X/6 and submersible to IP 68-8 (26 feet for 96 hours)) in accordance with EN 60529. During submersion it must be possible to operate the actuator at least 10 times. Enclosure must allow for temporary site storage without the need for electrical supply connection. All external fasteners shall be of stainless steel. Gear case shall be cast iron. In order to prevent condensation, a heater must be installed inside the actuator, suitable for continuous operation. Actuator must provide an alarm signal in case of failure of anti-condensation heater. Where required, actuators for hazardous locations shall be certified explosion proof for Class 1, Division 1 & 2, Groups C & D.

E. Motor
The electric motor shall be Class F insulated, with a duty rating of at least 15 minutes at 104°F (40°C) ambient temperature at an average load of at least 35% of rated actuator torque. Motor shall be specifically designed and built by the actuator manufacturer for electric actuator service characterized by high starting torque, low stall torque and low inertia. Commercially available motors shall not be acceptable. Electrical disconnection of the motor shall be by means of a plug and socket and motor removal shall be possible without loss of lubricant. The actuator must include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel regardless of the connection sequence of the power supply.

F. Motor protection
The following criteria shall be provided for motor protection:
1) The motor shall be de-energized without damage in the event of a stall condition when attempting to move a jammed valve.
2) The motor shall be de-energized in the event of an overtorque condition

3) Thermal devices (one for each phase of power) shall be imbedded in the motor windings to de-energize the motor in case of overheating.
4) Lost phase protection.

G. Gearing

The actuator gearing shall be totally enclosed in a grease-filled cast iron gear case suitable for operation in any orientation. Actuator gearing shall be hardened steel with alloy bronze worm wheel. The design should permit the opening of the gearcase for inspection or disassembly without releasing the stem thrust or taking the valve out of service. Where required per application, electric actuators can be provided with worm, bevel or spur gearboxes. For part-turn applications, worm gearboxes shall be supplied with full 360° bronze worm wheels and end-of-travel mechanical stops on the worm shaft. Gearbox designs with segmented worm gears and end-of-travel stops in the gearbox housing will not be permitted. Direct mount quarter-turn electric actuators not utilizing a separate worm gearbox shall incorporate end-of-travel mechanical stops and shall be capable of providing various swing angles of operation from 15° - 135°.

H. Manual operation

Manual operation shall be by side mounted handwheel which shall not rotate during motor operation. Handwheel declutch mechanism shall include an output contact to indicate actuator manual operation. Manual operation shall utilize the actuator worm shaft/worm wheel to maintain self-locking gearing and to facilitate changeover from motor to manual operation when the actuator is under load. Actuator designs that bypass electric actuator worm gears when declutched are unacceptable. The declutching from motor operation shall be at the motor shaft to minimize declutching effort. The amount of force required to declutch the actuator shall be the same regardless of the size of the actuator. Designs that break the valve load at the worm and worm gear are unacceptable. Return from manual to electric mode of operation will be automatic upon motor operation. A seized or inoperable motor shall not prevent manual operation.

I. Drive nut and thrust base assembly

For multi turn rising stem applications, the drive nut shall be installed in a detachable thrust base. The design shall allow actuator removal from the thrust base, leaving the thrust base attached to the valve to retain valve position. Thrust bearings shall be lubricated by means of an easily accessible grease fitting.

J. Valve position and torque calibration

Position and torque shall be sensed by absolute encoder using hall effect sensors. Incremental encoders requiring batteries to retain settings upon loss of power shall not be accepted.
Position and torque settings will be stored in permanent non-volatile memory.
Torque and travel adjustment parameters are to be as follows:

1) Position setting range 1 to 500 or 10 to 5,000 turns, with resolution of 2.81 degrees and accuracy to 5.0 degrees of actuator output.
2) Torque setting: 40% to 100% of rated torque.
   Torque switch bypass to be provided for the torque sensing system to inhibit torque switch trip during unseating or during starting in mid travel against high inertia loads.

## 1. Electric Actuator Control

A. Actuator status indication.

Six contacts shall be provided. The contacts shall have a minimum rating of 5A, 250VAC.

1) one contact dedicated for collective fault (phase failure, motor protection tripped, torque fault) or one of eight other fault groups
2) Five additional indication contacts selectable from a list of at least 45 parameters including, but not limited to: end position CLOSED, end position OPEN, selector switch in REMOTE mode, torque fault in CLOSED direction, and torque fault in OPEN direction.

B. Local indication

The actuator shall include a digital position indicator with a display from fully open to fully close in 1% increments. Six indicating lights shall be included. Five of which are programmable local indicating lights to indicate functions including, but not limited to: end position CLOSED, end position OPEN, fault, selector switch in REMOTE and actuator moving. The sixth light shall indicate Bluetooth® interface connectivity. All actuators shall always include a mechanical dial position indicator (MDPI) in addition to the digital position indicator for the purpose of providing visual valve position regardless of status of electrical power.

C Remote position and torque feedback

Actuator shall provide a 4 to 20 mA analog position feedback signal.
Actuator shall provide a 4 to 20 mA analog torque feedback signal corresponding to required valve torque for diagnostics and preventive maintenance.

D. Controls

General: All actuators shall be furnished with integral motor controls consisting of reversing starters, control transformer, automatic phase correction, monitor relay (to signal fault conditions such as thermal switch trip, torque switch tripped in mid-travel, wrong phase sequence or phase failure) and be capable of mounting up to 330ft from the valve/vault and include the following listed below:

E. Starter and Transformer

The starter shall be suitable for up to 60 starts per hour for open/close service and up to 1500 starts per hour for direct mount actuators used in modulating service. The applicable number of starts per hour depends on actuator size and output speed. A removable plug and socket controls housing containing LCD operations and diagnostics display, blue tooth interface, reversing starters or thyristors, power supply/control transformer and local controls capable of:

1) Being mounted integrally with the actuator and capable of being re-oriented at 90° increments, so that push buttons and indication lights will face the operator.
2) Being wall mounted remotely up to 330 ft (100m) where required by application conditions.

**F. Controls and control mode selector.**

The actuator shall include local Open/Stop/Close/Reset pushbuttons and a Local/Off/Remote selector switch lockable in any of the three positions. The Reset pushbutton shall be provided to facilitate actuator commissioning. It shall be possible to select maintained or non-maintained control independently for either the local or remote modes. It shall be possible to program the output direction of the actuator (clockwise or counterclockwise to close) without removal of any covers. It shall be possible to re-orient local pushbutton controls in 90° increments.

**G. Control capabilities – for control by contact closure / discrete signals**

The following control capabilities must be available:

1) Input remote control signals for:
    a. open/stop/close (maintained contacts) or emergency
    b. open/close ‘push to run’ (momentary)
    c. programmable emergency input for fail to any intermediate or end of travel positions when required
2) Programmable electronic torque switch bypass initialized in end and intermediate positions. Settable from 0-5 seconds.
3) Separate open and close direction pulse timer (stepping mode) circuits capable of initializing at any position (open, close or intermediate).
4) It shall be possible to reverse valve travel without the necessity of stopping the actuator. The starter contactors shall be protected from excessive current surges during travel reversal by an automatic time delay on energization of the contactor coils.

5) The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 1.1 kV.

**H. Control capabilities – for analog signal input**

The following control capabilities must be available:

1) 4-20 mA positioner (for all modulating actuators) to incorporate the following features: automatic end position settings, adaptive behavior (automatic setting of deadband), programmable deadband time, programmable tolerance for open/close end positions, programmable behavior on loss of signal, split range operation.
2) Programmable electronic torque switch bypass initialized in end and intermediate positions. Settable from 0-5 seconds.
3) Programmable emergency input for fail to any intermediate or end of travel positions when required.
4) The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 1.1 kV.

F. Monitoring Facilities

Facilities shall be provided for monitoring actuator operation and availability as follows:

1) Liquid Crystal Display (LCD) – minimum four lines back-lit for setting menu showing status indication and diagnostic information.
2) Monitoring capability via Bluetooth® connection
3) Retrievable (lifetime and re-settable) data logs including:
    a. motor run time
    b. total number of cycles
    c. number of torque trips in each direction of travel
    d. number of limit switch trips at each end of travel
    e. total torque trip faults
    f. motor thermal overloads.
4) Diagnostic capability, which will store and enable download of historical actuator operation, torque data to permit analysis of actuator, valve in-service performance and status signals according to NAMUR recommendation NE 107 via local display. Data download shall be carried out without removing any covers and all shall be available locally at the actuator or accessible via laptop computer.
5) Actuator controls shall have a real time clock for event recording to support asset management functions and life cycle analysis.

G. Wiring and Terminals

Internal wiring shall be tropical grade insulated stranded cable of appropriate size for the control and main power. All external wiring shall terminate in a removable double-sealed plug and socket connection, which allows easy disconnection of all power and control voltages. Actuators furnished without plug and socket terminal connections must have power and control disconnect switches for ease of maintenance and safety.

## 2. Electric Actuator Commissioning and Test Reports

A. Commissioning and Start-up Services

Each actuator will be provided with a commissioning kit consisting of a wiring diagram and installation and operation manual. No special commissioning tools or parts will be required for start-up. In order to prevent loss of screws during commissioning or maintenance, all covers shall be fixed with captive screws. In order to minimize the amount of spare parts required, parts such as covers, plug and sockets, parts must be interchangeable throughout all model sizes.

1) Field set-up verification shall be performed by the actuator manufacturers' factory authorized service representative technician.

B. Performance Test Documentation

Each actuator shall be performance tested. Test documentation can be provided if requested indicating the following:

1) torque sensing tripping points in both the open and closed directions of travel
2) current at the maximum torque tripping point
3) actuator output speed
4) high voltage test

C. Non-intrusive capability

In order to maintain the integrity of the enclosure, setting of all actuator parameters including the torque levels, position limits, configuration of the indication contacts and positioner functionality shall be accomplished without removing covers from the actuator control assemblies or housing. Settings shall be made by entering the set-up mode and following menu prompts appearing in the LCD window. The LCD window shall have four lines of data clearly indicating the set-up options. Set up shall be accomplished by using the actuator integral selector switch and pushbuttons. Actuator parameters may also be set by means of laptop computer or PDA via Bluetooth® interface.

D. Start-up and Commissioning Services)

Start-up services shall be performed by a factory authorized service technician.

**ADDENDUM NO. 3**

**SECTION 15100**
**PART 3.2**

**3.2 SCHEDULE**

| NUMBER | SIZE | SERVICE | ENDS | OPERATOR |
|---|---|---|---|---|
| ARV-1 | 1" | Backwash Line | Flg. | Automatic |
| ARV-2 | 1" | Backwash Line | Flg. | Automatic |
| ARV-3 | 1" | Backwash Line | Flg. | Automatic |
| | | | | |
| BFV-1 | 16" | Filter #3 Influent Valve | Flg. | 5 |
| BFV-2 | 16" | Filter #1 Backwash Valve | Flg. | 5 |
| BFV-3 | 16" | Flter #2 Backwash Valve | Flg. | 5 |
| BFV-4 | 16" | Filter #3 Backwash Valve | Flg. | 5 |
| BFV-5 | 18" | Filter #1 Drain Valve | Flg. | 5 |
| BFV-6 | 18" | Filter #2 Drain Valve | Flg. | 5 |
| BFV-7 | 18" | Filter #3 Drain Valve | Flg. | 5 |
| BFV-8 | 10" | Filter #1 Valve | Flg. | 5 |
| BFV-9 | 10" | Filter #2 Valve | Flg. | 5 |
| BFV-10 | 10" | Filter #3 Valve | Flg | 5 |
| BFV-11 | 8" | Filter #1 to Waste Valve | Flg | 5 |
| BFV-12 | 8" | Filter #2 to Waste Valve | F;g | 5 |
| BFV-13 | 8" | Filter #3 to Waste Valve | Flg | 5 |
| | | | Flg | |
| SRV-1 | 6" | Discharge Header Pipe to Distribution | Flg. | System Pressure |
| | | | | |
| GV-1 | 8" | Flocculator Basin Drain Valve | MJ | 3 |

***NOTES:***

**A. Ends**
**MJ - Mechanical Joint; Flg.-Flanged, F250 - Class 250 flange**

**NOTES:**

i. **Ends**
**MJ - Mechanical Joint; Flg. - Flanged, F250 - Class 250 flange**
**Unless shown in parentheses (_____)**

ii. **Operator**
- **(1) Cylinder operated with solenoid valve, speed control valves, adjustable limit switches, and an adjustable cylinder stop screw.**
- **(2) Handwheel operator with chain.**
- **(3) Gear operator with extension stem, operating nut and valve box.**
- **(4) Handwheel operator.**
- **(5) Electric operator.**
- **(6) Lever operator.**
- **(7) Indicating floorstand with extension stem.**

iii. **Mark Legend**

| | |
|---|---|
| **ARV** | **Air Release Valve** |
| **BFV** | **Butterfly Valve** |
| **CV** | **Check Valve** |
| **GV** | **Gate Valve** |
| **PV** | **Plug Valve** |
| **ARV** | **Air Release Valve** |
| **SRV** | **Surge Valve** |

D. **Pipe Gallery Flange - Flange Laying Length**

**Filter 1**

| Valve Size | Location | Laying Length |
|---|---|---|
| 10 inch | Filter | 3" |
| 8 inch | Waste | 6" |
| 16 inch | Backwash | 8" |
| 18 inch | Drain | 8" |

**Filter 2**

| Valve Size | Location | Laying Length |
|---|---|---|
| 10 inch | Filter | 3" |
| 8 inch | Waste | 6" |
| 16 inch | Backwash | 8" |
| 18 inch | Drain | 8" |

**Filter 3**

| Valve Size | Location | Laying Length |
|---|---|---|
| **10 inch** | **Filter** | **3"** |
| **8 inch** | **Waste** | **6"** |
| **16 inch** | **Backwash** | **8"** |
| **18 inch** | **Drain** | **8"** |