SECTION 46 33 33 – polymer blending and feed equipment

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. The polymer system shall be the standard equipment of the supplier involved in the manufacture of similar type equipment and shall be as manufactured by ProMinent Fluid Controls, Inc. or Engineer Approved Equal
				2. Equipment included with the polymer system includes

Single Motor Mixing Chamber

Dilution water controls

Diaphragm or Progressive Cavity Neat polymer pump

System Controls

System Accessories (as specified in Part 4 below)

* + - * 1. The polymer system shall be a complete skid mounted system including all interconnecting piping and wiring.
				2. Should equipment of a different type, size, weight or design of equipment, which otherwise differs from that specified herein or shown on the Drawings, be offered and determined to be the equal of that specified, such equipment shall be acceptable only on the basis that any revisions in the design and/or construction of the structure, piping, appurtenant equipment, electrical work, etc., required to accommodate such a substitution shall be made at no additional cost to the Owner, shall be the responsibility of the Contractor and shall be approved by the Engineer.
			1. REFERENCE STANDARDS
				1. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
				2. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
				3. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

American National Standard Institute (ANSI)

Occupational Safety and Health Administration (OSHA)

National Electrical Manufacturers Association (NEMA)

National Electrical Code (NEC)

Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

* + - 1. Related work specified elsewhere
				1. Section XX XX XX **-** Chemical Feed System, General
				2. Section XX XX XX **-** Pipe and Pipe Fittings
				3. Section XX XX XX **-** Plumbing
				4. Section XX XX XX **-** Instrumentation and Control
			2. SUBMITTALS
				1. Contractor shall provide all submittals in accordance with the requirements of Section XX XX XX, Submittal Procedures, and Section XX XX XX, Shop Drawings, Product Data and Samples.
				2. Product Data:

One (1) electronic copy of submittal data will be supplied for the system.

Component data and shop drawings of the system will be supplied, including dimensions, weight, and parts list.

Control panel elevation, control schematics and component data will be supplied.

* + - * 1. Record Documents:

Manufacturer's warranty form in which manufacturer agrees to repair or replace components that fails in materials or workmanship within specified warranty period.

* + - * 1. Operation and Maintenance Manuals. Provide complete operation and maintenance manuals for all equipment, in accordance with the requirements of Section XX XX XX, Closeout Procedures.
			1. quality assurance
				1. Manufacturer shall have minimum five years’ experience in manufacturing polymer activation and fee systems.
				2. All equipment provided under this section shall be obtained from a single supplier or manufacturer who shall assume full responsibility for the completeness and proper installation of the polymer activation and feed system.
				3. To insure quality and unit responsibility, the polymer activation and feed system must be assembled and tested by the manufacturer at its facility and be a standard regularly marketed product of that manufacturer. The manufacturer must have a physical plant, technical and design staff and fabricating personnel to complete the work specified.
				4. Prior to shipment the system shall be inspected for quality of construction verifying all fasteners and fittings are tight, all wires are secure and connection whisker-free. The system shall be tested under pressure for a minimum of one hour at 100 psi. If leaks are found they shall be fixed and a new test shall be conducted for one hour at 100 psi until the plumbing system is verified to be leak free.
1. PRODUCTS
	* + 1. GENERAL
				1. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
				2. The polymer activation and feed system shall be capable of effectively activating and fully blending with water a homogenous polymer solution ranging from 0.01% to 0.5% concentration.
			2. Systems Required

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| System Tag No. |  |  |  |  |
| Qty |  |  |  |  |
| Neat Polymer Type |  |  |  |  |
| Max Polymer Solution Feed Rate | gpm |  |  |  |
| Max Rated Neat Polymer Feed \* | gph |  |  |  |
| Max System Operating Pressure | psig |  |  |  |

* + - 1. System description
				1. True Multi-Zone Mixing Chamber

Polymer and water shall be mixed in a chamber designed to create sufficient mixing energy.

The chamber shall contain a minimum of three distinct chambers. Dual or single mixing chamber designs shall be unacceptable.

The design shall include a motor-driven impeller that will create high fluid sheer at point of polymer and water introduction. Systems that solely use a hydraulic means to activate polymer shall not be accepted.

Polymer solution shall undergo a tapered mixing intensity slope as it exits the initial sheer zone and passes through a second, and third mixing zones isolated by baffles.

Each chamber shall contain Polymer activation efficiency consistent over the entire dilution water range.

Mixing chamber shall be opaque to prevent solution degradation from ultraviolet light and to inhibit the growth of algae in the chamber. Clear or translucent mixing chambers shall be unacceptable.

Impellers shall be driven by a 1 HP maximum wash-down duty motor.

Motor shall be TEFC.

Impeller speed shall be 1730 rpm, minimum.

Motor shall be direct-coupled to impeller shafts.

* + - * 1. Dilution Water Control

Dilution water shall be split into two streams. Primary water flow shall supply the mixing chamber. Secondary water flow shall be used to post dilute the activated polymer stream to desired feed concentration.

Secondary water flow shall be used to post dilute the activated polymer stream to desired feed concentration.

These two streams shall be completely blended by an integrated static mixer prior to application injection point.

Unit shall have an electric solenoid valve for on/off control of total dilution water flow. Controls for the solenoid valve shall be factory installed/included in the polymer control system.

Dilution water flow shall be monitored by the controller via flow meters in both the Primary and Post dilution water streams.

Unit shall include a transparent static mixer in the solution discharge line.

* + - * 1. Injection valve

The polymer injection valve shall be easily removed via a twist-lock connection for routine maintenance needs. Injection valves installed via a threaded connection shall not be acceptable. Injection valves that are installed inside the mixing chamber, or which require mixing chamber disassembly for servicing will not be accepted.

The valve shall be easily disassembled with basic hand tools for cleaning during maintenance.

The injection valve shall be sealed into the chamber top with two o-rings and shall have been tested while installed in the system to maintain a pressure of 100 psig.

* + - * 1. Neat Polymer Metering Pump

Unit shall have one neat polymer metering pump. Pumps shall be either a positive displacement diaphragm type or progressive cavity design. Gear pumps shall not be acceptable. Pumps shall be supplied per the following

Diaphragm Metering Pump

The polymer pump shall be a microprocessor controlled solenoid driven diaphragm metering pump. All pump functions shall be accessible via an illuminated LCD screen and a membrane style keypad.

The pump shall be programmable so that the stroking speeds can be modified to accommodate various polymer viscosities.

Polymer pump shall accept a 4-20mA signal for speed control. Pump will also accept a 0-10 VDC or pulse input for speed control.

The pump shall be equipped with a fault annunciating relay which will be monitored by the system controller.

The pump shall supply a Pump Running feedback signal which will be monitored by the system controller.

In the case of a diaphragm pump installation the system shall have the provision to mount the neat polymer pump in either a flooded suction or suction lift configuration depending on the application requirements.

Progressive Cavity Pump

The system shall include a progressive cavity polymer metering pump for feeding emulsion polymers.

Progressing cavity pump output range shall be up to 24 GPH, with viscosities up to 40,000 cps.

Pump output shall be 100 psig maximum

Pump material of construction shall have a Viton stator and 316ss rotor encased in a 316SS shaft.

Pump shall include a 1/2hp 1750RPM, 1 phase, 220 Volt, 60 Hertz motor with local frequency inverter drive assembly. Systems utilizing external drive assemblies shall not be allowed.

Pump assembly shall include an external pressure relief valve and pressure gauge assembly.

* + - * 1. Controls

The unit shall include system controls housed in a Nema 4X polycarbonate enclosure

The system shall be controlled through an On-Off-Remote circuit controlled by a three-position switch and a two position switch that will determine the source (Local or Remote) for the controlling 4-20mA signal. The controls shall include a menu driven LCD display to allow for custom configuration of the system.

When the On-Off-Remote switch is in the Remote switch position, the unit shall accept a run signal. Unit is manually controlled in the On position.

The system shall accept a 4-20 mA analog signal to pace the polymer metering pump.

The unit shall provide hand or remote status indication via dry contact output.

The unit shall provide a running status indication via dry contact output.

A dilution water flow sensor shall detect the loss of water flow. Upon sensing that water flow has been interrupted for any reason, the controller will place the polymer pump and mix chamber on standby and will restart it automatically when flow is restored.

The systems shall incorporate automatic chamber flush controls that will be initiated upon system shut down. Timing for flush and the ability to disable the flush cycle shall be part of the custom programming options. The system shall also allow the ability to manually initiate a chamber flush cycle.

The controller shall offer the ability to adjust the following control parameters

Chamber water fill time

Chamber water flush time

Wait for dilution water flow time

Calibration and scaling of the incoming control 4-20mA signal

Calibration of the outgoing 4-20mA signal

Fail state due to the loss of the incoming control 4-20mA signal

The system shall have the provision to switch the controls to handle Mannich polymer in lieu of the standard emulsion polymer settings.

The system shall have the provision to operate in either an Inline or Batch mode as selected via the controller menu.

Controller interrogation and configuration shall be possible via an Ethernet connection permitting a graphical user interface.

* + - * 1. The polymer system shall be a ProMix S/C based packaged system as manufactured by ProMinent Fluid Controls, Pittsburgh, PA.
			1. Technical Data
				1. Connections – Plumbing

Dilution water inlet, 1-1/2” FNPT

Neat polymer inlet, 1" FNPT

Solution discharge, 1-1/2” FNPT

* + - * 1. Connections – Electrical

Power Required

Diaphragm Pump systems - 120 Volt, 1 Phase, 60 Hz, 20 Amps

Progressive Cavity Pump systems - 220 Volt, 1 Phase, 60 Hz, 20 Amps

4-20 mA signal input for control

Terminal blocks – dry contact input for remote start

* + - * 1. Dimensions

72” x 40” x 34” (H x W x D)

* + - * 1. Materials of Construction

304 Stainless Steel Welded Frame

Plumbing – PVC

Mixing chamber – PVC

* + - * 1. Pressure Rating – The mixing chamber shall be rated for a minimum of 100 psig operating pressure and shall have a maximum design pressure of 150 psig.
1. EXECUTION
	* + 1. INSTALLATION
				1. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
				2. The equipment shall be installed per the contract documents and manufacturer’s recommendations.

Provide a manufacturer’s certificate showing the equipment has been satisfactorily calibrated and tested.

An authorized manufacturer’s representative shall inspect the installation of all work furnished under this section and shall provide a certificate of proper installation.

* + - 1. MANUFACTURERS SERVICES
				1. The manufacturer or manufacturers representative shall provide the services of an experienced, authorized representative the equipment specified herein who shall be present at the jobsite and/or classroom designated by the City/District for the minimum man-days listed for the services shown below time travel excluded

One man-day per site for inspection, start-up, functional testing and certificate of proper installation.

One man-day per site for training and commissioning.

* + - 1. warranty
				1. Polymer feed system shall be warranted for a period of 12 months from the date of start-up by authorized technician.
				2. Damage due to makeup water particulates will not be considered as a warranty defect and will be the responsibility of the owner.
1. OPTIONAL ACCESSORIES
	* + - 1. Calibration cylinder: A suitably sized calibration cylinder shall be supplied for the neat polymer feed pump. Cylinder shall be mounted to frame with PVC isolation ball valves. Cylinder shall be calibrated in mL, and be constructed of clear PVC with slip on cap and ½ inch NPT vent connection.
				2. Drumstick: A rigid drumstick suitable for mounting in the neat polymer drum bunge or vent connection shall be supplied to completely evacuate the drums contents. The drumstick shall be supplied with 2 inch NPT and ¾ inch NPT connections for connection to either port. Drumstick construction shall be PVC.
				3. Drum Dryer: A desiccant drum dryer shall be supplied to eliminate moisture laden air from entering the polymer drum. The drum dryer shall include a ¾ inch connection for mounting in the drum vent port.
				4. Drum Dolly: A drum dolly/cradle shall be supplied for moving drums or tipping the drum on its side for dispensing. Polyolefin wheels and rollers shall be supplied for moving or positioning the drum, a kickstand shall be supplied to support the drum dolly in an upright position. Drum dolly shall have a 1 inch structural pipe frame, 1000 lb. capacity and suitable coating for corrosion prevention.

END OF SECTION 46 33 33