SECTION 11262 - POLYMER FEED SYSTEMS

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing metering, dissolving, and feeding [packaged] systems for anionic or nonionic polymer capable of receiving either dry or liquid polymer. The WORK includes providing all [tanks], pumps, mixers, drives, [piping, fittings, valves], supports, controls, accessories, and appurtenances, complete and operable.

B. The WORK also requires that one manufacturer accept responsibility for furnishing the WORK as indicated but without altering or modifying the CONTRACTOR'S responsibilities under the Contract Documents.

C. The WORK additionally requires that the one manufacturer who accepts the indicated responsibilities shall manufacture the dry polymer feeder and wetting equipment.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 11036 DC-SCR Drives
[2. Section 11195 Drum Pumps]
[3. Section 11204 Progressive Cavity Pumps]
[4. Section 11215 Rotary Lobe Pumps]
5. Section 11260 Chemical Feeding Equipment, General
6. Section 11261 Metering Pumps
[7. Section 13205 Polyethylene Tanks]
[8. Section 13209 Fiberglass Reinforced Plastic Tanks]

1.3 SERVICES OF MANUFACTURER

A. The feeding system equipment shall be calibrated under the direction of an authorized service representative.

B. **Inspection, Startup, and Field Adjustment:** An authorized representative of the manufacturer shall visit the site for not less than [ ] day to furnish the indicated services.

C. **Instruction of OWNER'S Personnel**: The authorized service representative shall also furnish the indicated services for instruction of the OWNER'S personnel in the operation and maintenance of the equipment including step-by-step troubleshooting procedures with necessary test equipment for not less than [one] day.

1.4 OWNER'S MANUAL

A. The CONTRACTOR shall provide, as part of the OWNER'S MANUAL, written certification that the calibration has been performed on each feed system and found to be in full compliance with the requirements of the Contract Documents.

PART 2 -- PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. **General:** The dry polymer make-up system shall have the ability to accurately meter, wet, thoroughly mix, dilute, age, and prepare a [0.25 to 1.0] percent solution from dry polymer with a bulk density ranging from [25 to 60] pounds per cubic foot. The liquid polymer make-up system shall also be capable of accurately feeding, thoroughly mixing and diluting to prepare a [0.25] percent feed solution from a [0.5 to 2] percent liquid stock polymer solution. Liquid stock polymer viscosity may range from [200 to 15,000 cp.] The maximum viscosity of the mixed solution will be approximately [5,000] centipoise. The mixed solution shall be uniform in properties, having no "fish eyes" or other indications of lack of uniformity or mixing. The system shall include all components necessary for the storage and metering of dry polymer, water supply metering device, an effective polymer wetting device, a pressure regulator, tank(s) with mixers, [transfer pump], all necessary level controls, local and remote alarms, a control panel for fully automatic and manual control, eductor, [all necessary piping, shock absorbers, solenoids and manual valves].

B. The polymer system shall have two tanks for the mixing, aging, and storage of the polymer. The system may use either of the following operational strategies:

1. One tank dedicated to mixing and aging with the other tank dedicated to storage of mixed and aged polymer (feed tank). A transfer pump shall be provided to transfer aged polymer from the first tank to the second tank. The metering pumps always feed polymer to the process from the second tank.

2. Both tanks are used alternately for both mixing and aging, and for storage of mixed and aged polymer. Operation of solenoid valves on the discharge piping of the tanks determines from which tank the metering pumps are feeding polymer to the process.

The design indicated in the Contract Documents has been based on strategy [1] [2] described above. It is the responsibility of the CONTRACTOR to perform any redesign necessary to use a system based on strategy [1] [2].

C. The feeder unit[s] shall operate in conjunction with metering pumps. An auxiliary fill connection shall be provided to the aging tank for feeding liquid stock polymers for dilution and aging.

D. Each system shall include the following:

1 - dry feeder with extension hopper and bag loader
[1] - aging tank[s]
[1 - feed tank]
[1] - mixer for aging tank
[1 - aged polymer transfer pump]
[2] - metering pump[s]
1 - control unit.
1 - liquid stock transfer pump and a flexible hose connection to the pump discharge to feed liquid polymer to the aging tank as indicated.

E. All isolation and shutoff valves shall be ball valves to match the piping system unless otherwise indicated.

[F. All components shall be mounted on skids. The total floor space shall not exceed [ ] square feet, exclusive of storage tanks, and the height shall not exceed [100 inches].]

2.2 DESIGN CRITERIA

A. Service: [DAFT] [Filters] [Centrifuges] [Secondary Clarifiers]

$# _____

NTS: A separate listing should be provided for each service. Because this listing may become very long if equipment is provided for several services, the specifier may want to create a table containing this criteria to appear at the end of the Section.

_____ #$

1. Dry Feeder

Equipment number	-	[ ]
Name	-	[ ]
Capacity, ft^3/hr, min	-	[ ]
Motor horsepower, min	-	[ ]

[2. Transfer Pumps

Equipment numbers	-	[ ]
Names	-	[ ]
Capacity, gpm	-	[ ]
Operating head, psi	-	[ ]
Motor horsepower, min	-	[ ]
Suction/discharge diameter, in	-	[ ]
Pump speed, rpm, max	-	[ ]]

3. Liquid Stock Transfer Pumps

Equipment number	-	[ ]
Name	-	[ ]
Capacity, gpm	-	[ ]
Operating head, psi	-	[ ]
Motor horsepower, min	-	[ ]
Suction/discharge diameter, in	-	[ ]
Pump speed, rpm, max	-	[ ]

4. Metering Pumps

Equipment numbers	-	[ ]
Names	-	[ ]
Capacity, gph	-	[ ]
Operating head, psi	-	[ ]
Motor horsepower, min	-	[ ]
Suction/discharge diameter, in	-	[ ]
Pump speed, rpm, max	-	[ ]

5. Aging Tank Mixer

Equipment number	-	[ ]
Name	-	[ ]
Motor horsepower, min	-	[ ]
Motor speed, rpm	-	[ ]
Mixer speed, rpm	-	[ ]

6. Aging Tank

Name	-	[ ]
Capacity, gal	-	[ ]
Diameter, feet	-	[ ]
Height, feet	-	[ ]

7. [Feed] [Aging] Tank Mixer

Equipment number	-	[ ]
Name	-	[ ]
Motor horsepower, min	-	[ ]
Motor speed, rpm	-	[ ]
Mixer speed, rpm	-	[ ]

8. [Feed] [Aging] Tank

Name	-	[ ]
Capacity, gal	-	[ ]
Diameter, feet	-	[ ]
Height, feet	-	[ ]

2.3 DRY FEEDER

A. The feeder shall be of the volumetric type to measure dry chemicals into a dissolving tank and produce a chemical solution. It shall be equipped with steel housing and spout, and stainless steel helix. Changes in feed rate shall be accomplished by a potentiometer and DC-SCR drive for manual adjustment over a 20:1 range, while feeder is in operation. DC-SCR drive shall be in accordance with Section 11036. Feeder drive shall operate on single-phase, 60-Hz, 115-volt. Each feeder shall be furnished with a [3.4 cu ft] extension hopper complete with lift-off cover. The hopper outlet shall be the same size as the feeder inlet to form a clean, compact installation. The feeder hopper shall be equipped with an electric vibrator, wired into the feeder rate setter, to ensure a positive chemical supply to the helix. Agitation shall be proportional to feed rate.

B. A dissolver shall be provided, constructed of materials completely resistant to corrosion by the chemical solution. The volumetric capacity shall be not less than 35 gallons. The dissolver shall have inlet water, discharge, overflow, and drain connections. It shall be provided with a cover and inspection plate. Mixing in the dissolver shall be accomplished by water jets or a mechanical mixer having a Type 316 stainless steel shaft and impeller, and driven by an electric motor. A float valve shall be provided, of suitable construction, to be installed in the dissolver to provide a flooded suction to the downstream injector. The injector shall be a [ ]-inch PVC injector.

C. The feeder shall be designed to deliver the chemical automatically in proportion to the rate of flow of the treatment plant. Automatic proportional pacing shall be the type which shall operate the feeder in proportion to a 4-20 mA control signal. There shall be provision for

adjusting the dosage, for manual adjustment of the feed rate, a hand-off-automatic selector switch for changing from automatic to manual control, and a local-remote selector switch.

[D. The feeder shall be attached to an overhead storage hopper furnished by the feeder manufacturer. The hopper shall be as shown and supported from the structural members. Total volumetric capacity shall be [ ] cu ft. A cover with loading lid and screen shall be provided. A flexible connection shall be provided between feeder and storage bin. The feeder manufacturer shall furnish a dust-tight gate at least 8 inches in diameter to fit between the feeder and storage hopper. The gate shall be manually operated from the feeder room floor. An electric vibrator shall be furnished and mounted on the storage hopper. The vibrator controller shall be wall-mounted. The vibrator shall be wired to operate only when the feeder is running. Agitation shall be proportional to feed rate.]

2.4 TRANSFER PUMPS

A. The transfer pumps shall be the positive displacement [rotary lobe type as indicted in Section 11215] [progressive cavity type as indicated in Section 11204].

2.5 METERING PUMPS

A. The metering pumps shall be positive displacement, hydraulically-activated diaphragm pumps as indicated in Section 11261. The pumps shall be of the simplex type with wetted metal parts of Type 316 stainless steel. The pumps shall be capable of pumping polymer against a head of 100 psig [minimum] and shall have valved bypass around the back pressure valve.

B. Unless otherwise shown, all metering pumps shall be provided with corrosion-resistant pulsation dampeners, valved calibration column, check valves, relief valves, and flush connections with check and solenoid valves, designed to stay open long enough after each pump shutdown to flush out the line [sample valves, pressure gages with diaphragm seals, and shut-off valves]. Dilution lines shall be connected by means of PVC injectors. [All pipe connections to feeders shall be firmly supported from a floor-mounted, galvanized, structural steel frame to avoid any stress on the feeder or on the piping system.]

2.6 LIQUID STOCK TRANSFER PUMP

A. Liquid stock transfer pump shall be the [drum type as specified in Section 11195] [progressive cavity type as specified in Section 11204].

2.7 AGING [AND FEED] TANKS

A. Tanks shall be constructed of [fiberglass per Section 13209] or [polyethylene per Section 13205].

2.8 MIXERS

A. Tank mixers shall be of the industrial, heavy duty, low-shear type with a maximum speed of 350 RPM. Mixers shall be of the clamp-on type to be mounted on a reinforced section of the tank wall, or they shall be flanged to match a mounting flange on top of the tank. The CONTRACTOR shall coordinate the construction of the tank to match the mixer mount. The mounting method shall provide sufficient stability to avoid excessive vibrations and fatigue of the tank wall. Vertical mixers shall be a built-together unit consisting of heavy duty electric motor, helical or spiral bevel gear reducer with oil bath, heavy-duty bearings with a

minimum L-10 life of 100,000 hours, vibration mount, cast iron gear housing, with stainless steel bolts and nuts. Each drive assembly shall have ample capacity to supply the required power and torque output, shall be suitable for use out-of-doors, and shall be of weatherproof construction. The shaft, impeller[s], and all wetted parts of each mixer shall be of Type 316 stainless steel. Impeller[s] shall be marine-type keyed to the drive shaft.

2.9 MANUFACTURERS

A. The chemical feeding equipment shall be the product of a manufacturer who has designed and manufactured similar equipment and has a record of not less than 5 years of successful municipal operation. The CONTRACTOR may be required to submit evidence to this effect together with a representative list of installations.

B. Products of the type indicated shall be manufactured by one of the following (or equal):

1. B.I.F. ["Polypak"]
2. Nalco [Customized Polyelectrolyte Feeding System, Model DA.]
3. Wallace and Tiernan [Model 35-300 Polymer System]

PART 3 -- EXECUTION

3.1 INSTALLATION

A. **General**: Products and equipment shall be installed in accordance with the manufacturer's written instructions.

** END OF SECTION **