



ENGINEERING CLARIFICATION

EC TITLE: Peristaltic Pump Flow Rate Modifications
PROJECT: 3 Kings Water Treatment Plant

EC NO.: 56
DATE: 8/14/2020
STATUS: Open

SECTION 1: BY CONTRACTOR

QUESTION:

Correction of maximum pump flow rate noted in the pump data sheet for pumps PMP-718-05 and PMP-720-06.

DRAWING NO.:
SPECIFICATION SECTION: 44 44 13.01 Peristaltic Chemical Metering Pumps

POTENTIAL COST IMPACT:
POTENTIAL SCHEDULE IMPACT:

PROPOSED SOLUTION:

See attached specification markup.

COMMENTS:

INITIATOR: Erinn Kunik

PRIORITY: Normal
REQUESTED RESPONSE DATE: 8/28/2020

SECTION 2: BY REVIEWER

RESPONSE:

COMMENTS:

REVIEWED BY:

REVIEWED DATE:

**SECTION 44 44 13.01
PERISTALTIC CHEMICAL METERING PUMPS**

EQUIPMENT AND COMPONENT NUMBERS

Calcium Thiosulfate Feed Pumps: PMP-340-144-01, 146-02, 148-03, 156-04

Ferric Sulfate Feed Pumps: PMP-800-201-01, -202-02, 203-03, 204-04

Sulfuric Acid Feed Pumps: PMP-800-305-01, 306-02, 307-03

Sodium Hydroxide Feed Pumps: PMP-405-01, 406-02, 407-03, 408-04, 409-05, 410-06

Sodium Hypochlorite Feed Pumps: PMP-800-710-01, 712-02, 714-03, 716-04, 718-05, 720-06.

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Institute of Electrical and Electronics Engineers (IEEE): 112, Standard Test Procedure for Polyphase Induction Motors and Generators.
2. Hydraulic Institute Standards.
3. National Electrical Manufacturer's Association (NEMA): MG 1, Motors and Generators.
4. American National Standards Institute (ANSI).
5. NSF International (NSF):
 - a. NSF/ANSI 61, Drinking Water System Components – Health Effects.
 - b. NSF/ANSI 372, Drinking Water System Components – Lead Content.

1.02 DEFINITIONS

A. Terminology pertaining to pumping unit performance and construction shall conform to the ratings and nomenclature of the Hydraulic Institute Standards.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Make, model, weight, and horsepower of each equipment assembly.
 - b. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.

- c. Performance data on pumps, including curves showing flow rate verses pump stroke setting (in percent) at specified maximum speed in strokes per minute and at minimum pump speed.
- d. Pump data sheet confirming pump capacity in gallons per hour and pressure in psig, required backpressure valve setting, pumped chemical characteristics, pipe connection sizes, stroke rate, materials, testing requirements, intermediate fluid type, and appurtenances to be provided with pumps.
- e. Detailed mechanical and electrical Drawings for pump and driver, including mounting requirements and piping connection sizes and locations.
- f. Power and control wiring diagrams, including terminals and numbers.
- g. Complete motor nameplate data, as defined by NEMA, motor manufacturer, and including any motor modifications.
- h. Manufacturer's materials compatibility information, confirming compatibility of wetted parts with specified pumped chemicals.
- i. Factory finish system.
- j. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

- 1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
- 2. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that factory finish system is identical to requirements specified herein.
- 3. Factory Functional and Performance Test Reports and Log.
- 4. Special shipping, storage and protection, and handling instructions.
- 5. Manufacturer's printed installation instructions.
- 6. Suggested spare parts list to maintain the equipment in service for a period of 1 year and 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
- 7. List special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
- 8. Operation and Maintenance Data: As specified in Section 01 78 23, Operation and Maintenance Data.
- 9. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.

3KINGS WTP PHASE III DESIGN

1.04 EXTRA MATERIALS

- A. Furnish for each set of pumps:
 - 1. Two replacement tube elements of each size.
 - 2. Two hose lubricant refills (if required).
- B. Furnish for each model of pump:
 - 1. One complete set of any special tools required to dismantle pump.
 - 2. One complete set of pump head assembly and rotor.

PART 2 PRODUCTS

2.01 GENERAL

- A. Coordinate pump requirements with drive manufacturer and be responsible for pump and drive requirements.
- B. Where adjustable speed drives are required, furnish a coordinated operating system complete with pump, drive, and speed controller.
- C. Design Requirements: In accordance with Section 01 61 00, Common Product Requirements.
- D. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.
- E. Motor shall comply with the requirements of electrical specification, Section 26 20 00, Low-Voltage AC Induction Motors.

2.02 SUPPLEMENTS

- A. Specific pump requirements are attached to this section as supplements.

2.03 PUMP

- A. Pumps shall be positive displacement peristaltic type complete with roller pump head and flexible tubing as specified.
- B. Pumps shall be dry self-priming, capable of being run dry without damaging effects to pump or tube.

- C. Process fluid shall be contained within the pump tubing and not directly contact any rotary or metallic components.
- D. Pump shall meet criteria for each pump on attached Pump Data Sheets.
- E. Materials of construction shall be compatible with each chemical as indicated on Pump Data Sheets.
- F. Pumphead:
 - 1. Pumphead shall consist of a fixed track, a hinged guard door, and spring-loaded roller rotor assembly. Pump tubing shall be in contact with the inside diameter of the track through an angle of 180 degrees. At all times, one roller shall be fully engaged with the tubing providing complete compression and preventing back flow or siphoning. Tube occlusion and spring tension shall be factory set to accommodate 2.4mm wall thickness tubing and shall not require adjustment.
 - 2. Pumphead guard shall be transparent for the purpose of viewing direction of rotation. When closed, the pump head guard shall seal against the pump track for leak containment and controlled waste through the pump head waste port in the event of a tube failure.
 - a. Pumphead Assembly:
 - 1) Pump Track Geometry must have a minimum 96.6 mm swept diameter through a minimum track angle of 180 degrees.
 - 2) Provide high corrosion/impact materials as specified on Data Sheets.
 - b. Rotor Assembly:
 - 1) Provide rotor assembly that ensures gradual tube occlusion and compensates for tube tolerance
 - a) Twin spring-loaded roller arms located 180 degrees apart, each fitted with stainless steel helical springs and compressing roller for occlusion of the tube twice per rotor revolution.
 - b) Compressing Rollers: Type 316 stainless steel with low friction stainless steel bearings and PTFE seals, minimum diameter of 18mm.
 - c) Provide non-compressing guide rollers constructed of corrosion resistant Nylatron.
 - 2) Clutch: Equip rotor with a central handgrip hub and manually activated clutch to disengage the rotor from the drive for manual rotor rotation during tube loading. Clutch shall automatically reengage rotor to gearbox upon one complete revolution.

- 3) Mounting: To prevent slip, the rotor assembly shall be axially secured to the dogged output shaft of the gearmotor via a slotted collect and central retaining screw.
- 4) Pumpheads requiring disassembly or special tools for tube changing are not acceptable.

G. Tubing:

1. Tube element shall be in contact with the inside diameter of the track (housing) through an angle of 180 degrees and be held in place on the suction and discharge by the element fittings. The tubing shall be replaceable without the use of tools and with no disassembly of the pumphead. To achieve maximum service life, pump heads with a track angle of less than 180 degrees and/or without tube elements are not acceptable.
2. Pumps requiring the pump to be running to change the tubing are not acceptable.

H. Drive:

1. Rating: Continuous 24-hour operation, 40 degrees C ambient maximum temperature.
2. Drive speed must be variable throughout the complete range.
3. Elevation: 6,845 feet.
4. Power Supply: 110 to 120V ac, 60-Hz, single-phase.
5. Enclosure: NEMA 4X.

I. Controls:

1. Communication protocol as defined in Section 40 99 90, Package Control Systems.
2. All control signal features must be located internally to the pump.
3. Supply auto control features to meet the following minimum functionality requirements:
 - a. Remote Control Inputs:
 - 1) Speed Control: 0 to 100 percent speed.
 - 2) Start/Stop Control: On/Off.
 - b. Status Outputs:
 - 1) Speed feedback.
 - 2) Run confirmation.
 - 3) Remote status.
 - 4) For any additional outputs, refer to Drawings.
4. Refer to Section 40 99 90, Package Control Systems, for additional details.

2.04 VALVES

- A. See Section 40 27 02, Process Valves and Operators.
- B. All materials in contact with the process fluid shall be chemically compatible with the specified fluid.

2.05 ACCESSORIES

- A. Equipment Identification Plate: 16-gauge stainless steel with 1/4-inch die-stamped equipment tag number securely mounted in a readily visible location.
- B. Lifting Lugs: Equipment weighing over 100 pounds.
- C. Anchor Bolts: Type 316 stainless steel, sized by equipment manufacturer, 1/2-inch minimum diameter, and as specified in Section 05 50 00, Metal Fabrications. Coat in accordance with Section 09 90 00, Painting and Coating.
- D. Leak Detection Switch :
 - 1. Locate at drain port of pump head or lowest point of pump head to detect leakage of pumped product into pump housing.
 - 2. Supply sensor Normally Closed with ability for field adjustment to Normally Open.
- E. Gauge Connections: Tapped and plugged suction and discharge gauge connections on piping headers adjacent to pumps.
- F. Calibration Column:
 - 1. Size: Selected by the metering pump manufacturer.
 - 2. Style: Cylinder graduated in 0.05-gallon increments, constructed of clear polypropylene and PVC, or as recommended by the manufacturer, with ball type shutoff valve.
 - 3. Process Connections: FNPT, 1/2-inch minimum, located in the top and bottom end caps. Provide calibration column as shown on Drawings.

2.06 FACTORY FINISHING

- A. Prepare, prime, and finish coat in accordance with Section 09 90 00, Painting and Coating.
- B. Manufacturer's standard epoxy finish.

3KINGS WTP PHASE III DESIGN

2.07 SOURCE QUALITY CONTROL

- A. Factory Tests and Adjustments: Test all equipment actually furnished.
- B. Factory Test Report: Include test data sheets.
- C. Functional Test: Perform manufacturer's standard motor test on equipment.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions .
- B. Anchor Bolts: Accurately place using equipment templates and as specified in Section 05 50 00, Metal Fabrications.

3.02 FIELD FINISHING

- A. Equipment as specified in Section 09 90 00, Painting and Coating.

3.03 FIELD QUALITY CONTROL

- A. Conduct tests on each pump.
- B. Functional Test:
 - 1. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
- C. Performance Test:
 - 1. Perform under actual or approved simulated operating conditions.
 - 2. Test for a continuous 3-hour period without malfunction.
 - 3. Test complete assemblies for correct rotation, proper connections, and normal operational characteristics.
 - a. Calibrate using calibration columns and water.
 - b. Document pump throughput at 1 rpm, 25 percent of maximum rpm, 50 percent of maximum rpm, 75 percent of maximum rpm, and at maximum rpm.
 - c. Plot performance test results on submitted pump curve.

3.04 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative: Present at Site or classroom designated by Owner, for minimum person-days listed below, travel time excluded:
 - 1. 1 person-day for installation assistance and inspection.
 - 2. 1 person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
 - 3. 1 person-day for facility startup.
 - 4. 1 person-day for post-startup training of Owner's personnel. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by Engineer.
- B. See Section 01 43 33, Manufacturers' Field Services, and Section 01 91 14, Equipment Testing and Facility Startup.

3.05 SUPPLEMENTS

- A. Supplement listed below, following "End of Section," are part of this Specification.
 - 1. Chemical Metering Pump Data Sheets:
 - a. 01, Calcium Thiosulfate Feed Pumps 1 through 4.
 - b. 02, Ferric Sulfate Feed Pumps 1 through 4.
 - c. 03, Sulfuric Acid Feed Pumps 1 through 3.
 - d. 04, Sodium Hydroxide Feed Pumps 1 through 6.
 - e. 05, Sodium Hypochlorite Feed Pumps 1 through 6.

END OF SECTION

CHEMICAL METERING PUMP DATA SHEET 01

Tag Numbers: PMP-340-144-01, PMP-340-146-02, PMP-340-148-03, PMP-340-156-04

Pump Name: Calcium Thiosulfate Feed Pumps 1 through 4

Manufacturer and Model Number: (1) Manufacturer to be determined through equipment pre-procurement.

SERVICE CONDITIONS

Liquid Pumped (Material and Percent): Calcium Thiosulfate (30%)

Pumping Temperature (Fahrenheit): Normal: 55 Max 80 Min 55

Specific Gravity @ 60 Degrees F: 1.25 Viscosity Range: 2.1 cSt

Liquid pH: 6.5 – 8.0

Abrasive (Y/N) N Possible Scale Buildup (Y/N): N

Suction Pressure (psig): Minimum 0

Altitude (ft msl): 6845 Area Classification: Location (indoor/outdoor): indoor

PERFORMANCE REQUIREMENTS

Calcium Thiosulfate Feed Pump 1 (DUTY): PMP-340-144-01: 0.04 to 1.0 gph, 45 psi max discharge pressure

Calcium Thiosulfate Feed Pump 2 (STANDBY): PMP-340-146-02: 0 .04 to 1.0 gph, 45 psi max discharge pressure

Calcium Thiosulfate Feed Pump 3 (DUTY): PMP-340-148-03: 0 .04 to 1.0 gph, 45 psi max discharge pressure

Calcium Thiosulfate Feed Pump 4 (DUTY): PMP-340-156-04: 0 .8 to 3.0 gph, 45 psi max discharge pressure

DESIGN AND MATERIALS

Hose Material: Marprene or Santoprene

Hose Size: 3.2 mm (manufacturer to confirm)

Hose Pressure Rating : PMP-340-144-01, PMP-340-146-02, PMP-340-148-03, and PMP-340-156-04: 60 psi

Leak Detector (Y/N) Y

Calibration Cylinder: Quantity: 1 Material: Units: gal Capacity:

Pump Speed Control: Constant Variable X

DRIVE MOTOR (See Section 26 20 00, Low-Voltage AC Induction Motors)

Horsepower: ≤1 Voltage: 120 Phase: 1 Synchronous Speed (rpm)

Service Factor: 1.0 Inverter Duty (Y/N): Y

Motor nameplate horsepower shall not be exceeded at any head-capacity point on pump curve.

REMARKS Include calibration columns as shown on Drawings and any additional required appurtenances. Materials in contact with pumped solution shall be NSF 61 certified.

CHEMICAL METERING PUMP DATA SHEET 02

Tag Numbers: PMP-800-201-01, PMP-800-202-02, PMP-800-203-03, PMP-800-204-04

Pump Name: Ferric Sulfate Feed Pumps 1 through 4

Manufacturer and Model Number: (1) Manufacturer to be determined through equipment pre-procurement.

SERVICE CONDITIONS

Liquid Pumped (Material and Percent): Ferric Sulfate (10 to 12% Fe)

Pumping Temperature (Fahrenheit): Normal: 55 Max 85 Min 55

Specific Gravity @ 60 Degrees F: 1.38 – 1.55 Viscosity Range: _____

Liquid pH: <2.0

Abrasive (Y/N) N Possible Scale Buildup (Y/N): N

Suction Pressure (psig): Minimum 0

Altitude (ft msl): 6845 Area Classification: Location (indoor/outdoor): indoor

PERFORMANCE REQUIREMENTS

Ferric Sulfate Feed Pump 1 (DUTY): PMP-800-201-01: 0.6 to 15 gph, 25 psi max discharge pressure

Ferric Sulfate Feed Pump 2 (STANDBY): PMP-800-202-02: 0.6 to 15 gph, 25 psi max discharge pressure

Ferric Sulfate Feed Pump 3 (DUTY): PMP-800-203-03: 0.6 to 2.0 gph, 20 psi max discharge pressure

Ferric Sulfate Feed Pump 4 (STANDBY): PMP-800-204-04: 0.6 to 2.0 gph, 20 psi max discharge pressure

DESIGN AND MATERIALS

Hose Material: Marprene or Santoprene

Hose Size: PMP-800-201-01 and PMP-800-202-02: 6.4 mm, PMP-800-203-03 and PMP-800-204-04: 3.2 mm (manufacturer to confirm)

Hose Pressure Rating : 30 psi

Leak Detector (Y/N) Y

Calibration Cylinder: Quantity: 1 Material: _____ Units: gal Capacity: _____

Pump Speed Control: Constant Variable X

DRIVE MOTOR (See Section 26 20 00, Low-Voltage AC Induction Motors)

Horsepower: ≤1 Voltage: 120 Phase: 1 Synchronous Speed (rpm) _____

Service Factor: 1.0 Inverter Duty (Y/N): Y _____

Motor nameplate horsepower shall not be exceeded at any head-capacity point on pump curve.

REMARKS Include calibration columns as shown on Drawings and any additional required appurtenances. Materials in contact with pumped solution shall be NSF 61 certified.

CHEMICAL METERING PUMP DATA SHEET 03

Tag Numbers: PMP-800-305-01, PMP-800-306-02, PMP-800-307-03

Pump Name: Sulfuric Acid Feed Pumps 1 through 3

Manufacturer and Model Number: (1) Manufacturer to be determined through equipment pre-procurement.

SERVICE CONDITIONS

Liquid Pumped (Material and Percent): Sulfuric Acid (93%)

Pumping Temperature (Fahrenheit): Normal: 55 Max 85 Min 55

Specific Gravity @ 60 Degrees F: 1.8 Viscosity Range: 21 mPa.s

Liquid pH: 0.3 – 2.1

Abrasive (Y/N) N Possible Scale Buildup (Y/N): N

Suction Pressure (psig): Minimum 0

Altitude (ft msl): 6845 Area Classification: Location (indoor/outdoor): indoor

PERFORMANCE REQUIREMENTS

Sulfuric Acid Feed Pump 1 (DUTY): PMP-800-305-01: 0 .05 to 2.0 gph, 40 psi max discharge pressure

Sulfuric Acid Feed Pump 2 (STANDBY): PMP-800-306-02: 0.05 to 7.0 gph, 45 psi max discharge pressure

Sulfuric Acid Feed Pump 3 (DUTY): PMP-800-307-03: 0.6 to 7.0 gph, 45 psi max discharge pressure

DESIGN AND MATERIALS

Hose Material: Marprene or Santoprene

Hose Size: PMP-800-305-01: 6.4 mm, PMP-800-306-02: 3.2 or 6.4 mm, PMP-800-307-03: 3.2 mm (manufacturer to confirm)

Hose Pressure Rating: 60 psi

Leak Detector (Y/N) Y

Calibration Cylinder: Quantity: 1 Material: _____ Units: gal Capacity: _____

Pump Speed Control: Constant Variable X

DRIVE MOTOR (See Section 26 20 00, Low-Voltage AC Induction Motors)

Horsepower: ≤1 Voltage: 120 Phase: 1 Synchronous Speed (rpm) _____

Service Factor: 1.0 Inverter Duty (Y/N): Y _____

Motor nameplate horsepower shall not be exceeded at any head-capacity point on pump curve.

REMARKS Include calibration columns as shown on Drawings and any additional required appurtenances. Materials in contact with pumped solution shall be NSF 61 certified.

CHEMICAL METERING PUMP DATA SHEET 04

Tag Numbers: PMP-800-405-01, PMP-800-406-02, PMP-800-407-03, PMP-800-408-04,
PMP-800-409-05, PMP-800-410-06

Pump Name: Sodium Hydroxide Feed Pumps 1 through 6

Manufacturer and Model Number: (1) Manufacturer to be determined through equipment pre-procurement.

SERVICE CONDITIONS

Liquid Pumped (Material and Percent): Sodium Hydroxide (25%)

Pumping Temperature (Fahrenheit): Normal: 55 Max 80 Min 55

Specific Gravity @ 60 Degrees F: 1.15 – 1.55 Viscosity Range: 18 cP

Liquid pH: 13.0 – 14.0

Abrasive (Y/N) N Possible Scale Buildup (Y/N): Y

Suction Pressure (psig): Minimum 0

Altitude (ft msl): 6845 Area Classification: Location (indoor/outdoor): indoor

PERFORMANCE REQUIREMENTS

Sodium Hydroxide Feed Pump 1 (DUTY): PMP-800-405-01: 0.5 to 40 gph, 35 psi max discharge pressure

Sodium Hydroxide Feed Pump 2 (STANDBY): PMP-800-406-02: 0.5 to 40 gph, 35 psi max discharge pressure

Sodium Hydroxide Feed Pump 3 (DUTY): PMP-800-407-03: 0.9 to 20 gph, 30 psi max discharge pressure

Sodium Hydroxide Feed Pump 4 (STANDBY): PMP-800-408-04: 0.9 to 20 gph, 30 psi max discharge pressure

Sodium Hydroxide Feed Pump 5 (DUTY): PMP-800-409-05: 0.2 to 1.0 gph, 25 psi max discharge pressure

Sodium Hydroxide Feed Pump 6 (STANDBY): PMP-800-410-06: 0.2 to 1.0 gph, 25 psi max discharge pressure

DESIGN AND MATERIALS

Hose Material: Marprene or Santoprene

Hose Size: PMP-800-405-01 and PMP-800-406-02: 9.6 mm, PMP-800-407-03 and PMP-800-408-04: 6.4 mm, PMP-800-409-05 and PMP-800-410-06: 3.2 mm (manufacturer to confirm)

Hose Pressure Rating: PMP-800-407-03, PMP-800-408-04, PMP-800-409-05,
PMP-800-410-06: 30 psi, PMP-800-405-01 and PMP-800-406-02: 60 psi

Leak Detector (Y/N) Y

Calibration Cylinder: Quantity: 1 Material: Units: gal Capacity:

Pump Speed Control: Constant Variable X

DRIVE MOTOR (See Section 26 20 00, Low-Voltage AC Induction Motors)

Horsepower: ≤1 Voltage: 120 Phase: 1 Synchronous Speed (rpm)

Service Factor: 1.0 Inverter Duty (Y/N): Y

Motor nameplate horsepower shall not be exceeded at any head-capacity point on pump curve.

REMARKS Include calibration columns as shown on Drawings and any additional required appurtenances. Materials in contact with pumped solution shall be NSF 61 certified.

CHEMICAL METERING PUMP DATA SHEET 05

Tag Numbers: PMP-800-710-01, PMP-800-712-02, PMP-800-714-03, PMP-800-716-04,
PMP-800-718-05, PMP-800-720-06

Pump Name: Sodium Hypochlorite Feed Pumps 1 through 6

Manufacturer and Model Number: (1) Manufacturer to be determined through equipment pre-procurement.

SERVICE CONDITIONS

Liquid Pumped (Material and Percent): Sodium Hypochlorite (0.8%)

Pumping Temperature (Fahrenheit): Normal: 55 Max 80 Min 55

Specific Gravity @ 60 Degrees F: 1.01 Viscosity Range: _____

Liquid pH: 9.0 – 10.0

Abrasive (Y/N) N Possible Scale Buildup (Y/N): N

Suction Pressure (psig): Minimum 0

Altitude (ft msl): 6845 Area Classification: Location (indoor/outdoor): indoor

PERFORMANCE REQUIREMENTS

Sodium Hypochlorite Feed Pump 1 (DUTY): PMP-800-710-01: 2.0 to 30 gph, 25 psi max discharge pressure

Sodium Hypochlorite Feed Pump 2 (STANDBY): PMP-800-712-02: 2.0 to 30 gph, 25 psi max discharge pressure

Sodium Hypochlorite Feed Pump 3 (DUTY): PMP-800-714-03: 15 to 105 gph, 25 psi max continuous discharge pressure (45 psi max intermittent discharge pressure)

Sodium Hypochlorite Feed Pump 4 (STANDBY): PMP-800-716-04: 15 to 105 gph, 25 psi max continuous discharge pressure (45 psi max intermittent discharge pressure)

Sodium Hypochlorite Feed Pump 5 (DUTY): PMP-800-718-05: 2.0 to 25.0 gph, 22.5 gph 25 psi max continuous discharge pressure (35 psi max intermittent discharge pressure)

Sodium Hypochlorite Feed Pump 6 (STANDBY): PMP-800-720-06: 2.0 to 25.0 gph, 22.5 gph 25 psi max continuous discharge pressure (35 psi max intermittent discharge pressure)

DESIGN AND MATERIALS

Hose Material: Marprene or Santoprene

Hose Size: PMP-800-710-01 and PMP-800-712-02: 9.6 mm (Watson-Marlow Series 530), PMP-800-714-03 and PMP-800-716-04: 12 mm (Watson-Marlow

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Series 630), PMP-800-718-05 and PMP-800-720-06: 6.4 mm (Watson-Marlow Series 530) (manufacturer to confirm).

Hose Pressure Rating: PMP-800-710-01, PMP-800-712-02: 30 psi, PMP-800-714-03, PMP-800-716-04, PMP-800-718-05 and PMP-800-720-06: 60 psi

Leak Detector (Y/N) Y

Calibration Cylinder: Quantity: 1 Material: _____ Units: gal Capacity: _____

Pump Speed Control: Constant Variable X

DRIVE MOTOR (See Section 26 20 00, Low-Voltage AC Induction Motors)

Horsepower: ≤1 Voltage: 120 Phase: 1 Synchronous Speed (rpm) _____

Service Factor: 1.0 Inverter Duty (Y/N): Y _____

Motor nameplate horsepower shall not be exceeded at any head-capacity point on pump curve.

REMARKS Include calibration columns as shown on Drawings and any additional required appurtenances. Materials in contact with pumped solution shall be NSF 61 certified.