



ADDENDUM NO. 3

Issue Date: May 11, 2021

Project Name: South Oslo Road WTP Improvements

Bid Number: 2021026

Bid Opening Date: May 19, 2021

This addendum is being released to answer questions received to date, allow one additional site visit, and modify the bid documents. The information and documents contained in this addendum are hereby incorporated in the invitation to bid. **This addendum must be acknowledged where indicated on the bid form, or the bid will be declared non-responsive.**

Additional Site Visit:

An informal site visit is offered for bidders and subcontractors on **Thursday, May 13, 2021 from 9:00 a.m.-10:00 a.m.** No questions will be answered, but the project areas can be viewed.

Modifications to Bid Documents:

SECTION 01010 – SUMMARY OF WORK

MODIFY item 1.7 C to ADD: "Indian River County will pay for building permit application, impact and inspection fees, with the exception of re-inspection fees as set forth in the contract per 00100-1.23."

SECTION 11209 – MEMBRANE SOFTENING SYSTEM

Replace paragraph 2.4 A with the following: "All stainless-steel pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified. The manufacturer shall be qualified to perform work in accordance with the ASME Code Standards. The stainless-steel pipe, fittings and appurtenances shall be designed and fabricated in accordance with ASME B31.3. Welding procedures must be submitted and approved before fabrication can begin."

SECTION 11209 – MEMBRANE SOFTENING SYSTEM

Replace paragraph 2.6 F with the following: "Plastic sample tubing shall be ¼" or 3/8" OD. High-pressure tubing shall have a minimum working pressure of 300 psi at 75 deg. F. Low-pressure tubing shall have a minimum working pressure of 100 psi @ 75 deg. F. Sample tubing shall be black. Tubing shall be manufactured by Imperial Eastman Division, Imperial Clevite, Inc., or equal."

SECTION 11932 – FRP HORIZONTAL END SUCTION PUMP

REPLACE this specification with the revised section included in this response (see attached).

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SECTION 13442 – FIELD INSTRUMENT PANELS

ADD to table of contents and technical specifications. Included within this addendum response.

Questions and Answers

Question #1: Protec Arisawa is inquiring why one company is sole sourced on this major component of the membrane treatment system. The PRO-8-300-MSP-6 meets all the specifications, A-H and K listed in 2.2. In the interest of fair and competitive bidding and sourcing, Protec finds it very abnormal for a municipal job to have only one supplier specified and for Protec Arisawa to be excluded from the specification. Will Protec be approved to bid and accepted to supply vessels to qualified OEMs/GCs bidding this project?

Response: IRCU is standardizing on one manufacturer to match their other system components already on-site and other facilities. Protec can be considered a “substitute” in accordance with the contract documents, specifically section 11209. Requirements for proposing this product as a substitute shall be strictly adhered to.

Question #2: Will FRP pressure vessel support structure be considered for use in this project?

Response: Yes.

Question #3: Section 11209 1.2 F. Section 13442 – Field Instruments referenced could not be found in the spec under that section number or description. Is this section missing or supposed to reference another section?

Response: Specification 11209 1.2 F has been included in this addendum response.

Question #4: Section 11209 2.2 J. Pressure Vessels list Codeline as the only acceptable pressure vessel manufacturer. Since all NF trains are being replaced there are not existing vessels remaining that would need to try to be matched. Are vessels manufactured by Protec in California acceptable since they have equivalent specs?

Response: Protec can be considered as a “substitute” in accordance with the contract documents, specifically section 11209. Requirements for proposing this product as a substitute shall be strictly adhered to.

Question #5: Section 11209 2.3 Pressure Vessel Supports requires that the pressure vessel support structure be fabricated using 304 or 316/316L dual grade stainless steel. Is structural fiberglass sections produced by Strongwell Extren 500 an acceptable frame material alternative? We have been designing and fabricating pressure vessel support structures constructed of structural fiberglass for forty eight years and are considered superior to stainless steel. The fiberglass frames are primed with an epoxy primer and finished coated with a high quality urethane finish coat. They require no maintenance and will never rust as can be the case stainless steel support structures. The fiberglass frames are designed to meet or exceed any required wind or seismic requirements. Another benefit of fiberglass frames on this project is the limited space to access the NF system locations. The fiberglass support structures are very light compare to a stainless steel support structure making the installation easier with the narrow space on the ends of the existing NF systems that have to continue to operate until they are replaced. We have provided many fiberglass pressure vessel support structures on Kimley-Horn projects with outstanding results.

Response: Fiberglass pressure vessel support structure can be considered as an acceptable alternative, provided requirements of the specification not pertaining to stainless steel fabrication, are met (i.e. structural calculations by a registered Florida PE, rigid frame design, etc.).

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Question #5: Section 11209 2.4 A. Feed, Concentrate and Permeate Piping requires the stainless steel piping manufacturer to hold one or all of the ASME accredited code stamps ("U", "S", "PP"). These ASME code stamps refer to Pressure Vessels, Boilers and Power Piping Systems which are not applicable to this application. These ASME code stamps eliminate all but one of our quality stainless steel piping fabricators that happens to also make pressure vessels. Limiting the qualified piping fabricators by requiring code stamps not directly applicable to process piping decreases the competitive bid process and increasing cost unnecessarily. All of our stainless piping fabricators fabricate in accordance with ASME B31.3 which is applicable to this project. We request that the requirement of ASME code stamp "U", "S", "PP" be removed from the specification as they are not applicable.

Response: Removal of this requirement is acceptable and will be revised accordingly.

Question #6: Section 11209 2.4 K. Cleaning connections are described as being quick connect and the plans show removable spool pieces. Installing cleaning isolation valves with hard piped cleaning piping instead of removable spool pieces is highly recommended for trains of this size (like the existing trains have). Since the cleaning connections are 6", the spool pieces are quite large, increase the labor of performing a cleaning, limit the flexibility of how cleaning are performed and can potentially expose personnel to spilling chemical when spools are removed.

Response: Installation of valves and hard piped connections between the NF train and the cleaning system is considered a cross-connection and is not acceptable.

Question #7: Section 11209 2.5 B. 2. Appears pressure transmitter list is missing 2nd stage concentrate pressure. As this is a critical pressure to monitor and is different for each train, should it be included so there is four pressure transmitters per train?

Response: Refer to the P&IDs which include 2nd stage differential pressures for each train. 2nd stage concentrate PIT not needed.

Question #8: Section 11209 2.6 F. Sample Panel specifies 3/8" tubing. In our experience 1/4" tubing is more than sufficient for sufficient sample flow and for pressure gauges/transmitters. 1/4" tubing takes up much less space and is more aesthetic and manageable when bundled together and reduces the size and cost of the sample panel valves. Is 1/4" sample tubing and valves an acceptable alternative?

Response: 1/4" black polyethylene tubing will be acceptable.

Question #9: Section 11209 2.7 D. Spare Parts lists providing flexible hosing to connect NF permeate to NF concentrate to facilitate flushing of train during startup. Large diameter hose greater than 2" becomes very difficult to work with. If this capability is intended to be used long term, hard piping and valving is highly recommended.

Response: This is a temporary connection to dispose of permeate until the train passes bacteriological sampling. This hose will likely be used once a decade. No hard-piped connections of permeate to concentrate will be accepted as this presents a cross-connection.

Question #10: Specification 01590, Section 3.4, provides a list of furnishings for the Engineer's trailer but it doesn't state what size trailer is desired. Please confirm if a trailer and its furnishings are required. Otherwise, please state what size trailer should be considered.

Response: An engineer's trailer and furnishings are required as described herein. Prospective bidders are herein notified that progress meetings will be held inside either the engineer's or the Contractor's trailer and will include 8 personnel from the County and the EOR team and therefore shall be sized accordingly.

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Question #11: Per Article 1.23 of the Instruction to Bidders, permit fees to the Building Department are to be paid by Indian River County. Specification 01010, Section 1.7.C, states that the Contractor pays for the fees. Please clarify.

Response: In accordance with INSTRUCTIONS TO BIDDERS, all permit, impact, or inspection fees in connection with this work are to be paid by INDIAN RIVER COUNTY. The Bidder shall NOT include any permit, impact, or inspection fees payable to INDIAN RIVER COUNTY. This question has been addressed in previous addendum response.

Question #12: Is builder's risk insurance required?

Response: Yes, builder's risk insurance requirement is described in the general and supplementary conditions of this contract.

Question #13: Will an alternative FRP end suction pump, Fybroc Series 1500 size 4x6x13 be considered for this project? This will yield a 60-hp pump in lieu of 75-hp.

Response: Yes, this specification has been revised to account for this revision. Contractor shall provide overloads at the combination starter for the CIP pump.

Attachments:

SECTION 11932 – FRP HORIZONTAL END SUCTION PUMP

REPLACE this specification with the revised section included in this response (see attached).

SECTION 13442 – FIELD INSTRUMENT PANELS

ADD to table of contents and technical specifications. Included within this addendum response.

SECTION 11932
FRP HORIZONTAL END SUCTION PUMP

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install, place in operation, and start up constant speed electric motor driven, ANSI FRP horizontal end suction pump for the membrane clean-in-place as specified herein and shown on the Drawings.
- B. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment application. It is, however, intended to cover the furnishing, the shop testing, the delivery and complete installation and start up (including field testing) of all materials, equipment and appurtenances for the complete pumping units as herein specified, whether specifically mentioned in these specifications or not.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Section 01300 – Submittals
- B. Section 11506 – Membrane Cleaning System
- C. Section 11930 – Pumps - General
- D. Section 16690 – Electric Motors

1.3 REFERENCE STANDARDS

- A. Design, manufacture and assembly of elements of the equipment herein specified shall be in accordance with, but not limited to, published standards of the following, as applicable:
 - 1. American Gear Manufacturers Association (AGMA)
 - 2. American Institute of Steel Construction (AISC)
 - 3. American Iron and Steel Institute (AISI)
 - 4. American Society of Mechanical Engineers (ASME)
 - 5. American National Standards Institute (ANSI)
 - 6. American Society for Testing Materials (ASTM)
 - 7. American Welding Society (AWS)
 - 8. American Bearing Manufacturers Association (ABMA)
 - 9. Hydraulic Institute Standards (current edition)
 - 10. Institute of Electrical and Electronics Engineers (IEEE)
 - 11. National Electric Code (NEC)
 - 12. National Electrical Manufacturers Association (NEMA)
 - 13. Occupational Safety and Health Administration (OSHA)
 - 14. Steel Structures Painting Council (SSPC)
 - 15. Underwriters Laboratories, Inc. (UL)
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 QUALITY ASSURANCE

- A. To assure unity of responsibility, the motor and base plate shall be furnished and coordinated by the pump manufacturer.
- B. The equipment covered by these specifications is intended to be standard pumping equipment of proven ability as manufactured by companies having experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed to operate satisfactorily when installed as shown on the Contract Drawings and as specified herein.
- C. Pump shall be manufactured in accordance with the Hydraulic Institute Standards, except where otherwise specified herein.
- D. The manufacturer shall be fully responsible for the design, arrangement and operation of all connected rotating components, of the assembled pumping unit mounted on a fabricated steel baseplate, to ensure that neither harmful nor damaging vibrations occur anywhere within the specified operating range.

1.5 PUMP PERFORMANCE DATA & CERTIFIED TEST RESULTS

- A. Factory testing in accordance with the standards of the Hydraulic Institute shall be required for each pump.
- B. Certified pump performance curves shall be submitted for approval by the Engineer on the cleaning pump prior to shipment. The certified pump performance curve shall be submitted, including head, capacity, brake horsepower, and pump efficiency for each pump supplied. Certified data shall be provided to indicate the NPSH required by the pump at the design point as specified.
- C. The pump shall be tested through the specified range of flow, and head/capacity/efficiency curves plotted at maximum output speed. During each test, the pump shall be run at each head condition for sufficient time to accurately determine discharge, head, power input, and efficiency. The pump will be tested with a suction head (including vapor pressure, velocity head friction loss and static suction head) as required to demonstrate the NPSH required by the pump at the design point as specified.
- D. If any pump tested fails to meet any specification requirement it will be modified until it meets all specification requirements. If any pump tested fails to meet the efficiency requirements at any of the listed flow or head conditions as specified and all reasonable attempts to correct the inefficiency are unsuccessful, the pump(s) shall be replaced with unit(s) which meet the specified requirements. Performance data must be the results of project pump and motor assemblies. Also report amperage and voltage of each power leg, efficiency, horsepower and NPSH.

1.6 OPERATION

- A. The pump will recirculate cleaning solution as part of the membrane cleaning system.

1.7 SUBMITTALS

- A. The pump manufacturer will submit data and specifications for the pumping unit and will include but not be limited to the following.
 - 1. Name of Manufacturer
 - 2. Type and Model
 - 3. Design Rotative Speed
 - 4. Type of Bearings

5. Size of Shafting
6. Size of Suction Connection
7. Size of Discharge Connection
8. Certified dimensional drawings of each item of equipment and auxiliary apparatus to be furnished.
9. Certified foundation, pump support and anchor bolt plans and details.
10. Schematic electrical wiring diagram and other data as required for complete pump installation.
11. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the detail specifications.
12. Total weight of pumping unit.
13. Pump performance curves showing capacity versus head, NPSHR, pump efficiency, and pump BHP plotted to scales consistent with performance requirements.
- B. Provide submittals in accordance with Section 01300.
- C. Provide O & M manuals in accordance with Section 01730.
- D. Provide manufacturer's certification of correct installation after manufacturer's inspection and start up.

1.8 OPERATING INSTRUCTIONS

- A. Operating and maintenance manuals shall be furnished. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operation and maintenance personnel unfamiliar with such equipment. The number and special requirements shall be as specified in Section 01730.

1.9 TOOLS & SPARE PARTS

- A. The following spare parts shall be furnished:
 1. One mechanical seal assembly
 2. One set of gaskets
- B. Store spare parts, drivers, etc. in strict accordance with manufacturer's recommendations. Notify the owner in writing of any special storage maintenance required and provide such maintenance until final acceptance of contract.

1.10 PRODUCT HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are operational.
- B. All equipment and parts must be properly protected against any damage during a prolonged period at the site.
- C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
- D. Finished surfaces of all exposed pump openings shall be protected by wooden blanks, strongly built and securely bolted thereto.
- E. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

- F. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.
- G. Each box or package shall be properly marked to show its net weight in addition to its contents.

1.11 MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall provide the services of one or more qualified manufacturer's technical representatives who shall adequately supervise and certify the installation, conduct field testing of the pumping equipment furnished under this Contract, and instruct the Contractor's personnel and the Owner's personnel in its maintenance and operation of the units. The services of the manufacturer's representative shall provide for at least two days as follows:
 - 1. One day trip shall be for the review of the pump installation.
 - 2. One day trip shall be for time on-site for start-up and for operational assistance and training.

1.12 WARRANTY

- A. The equipment shall be warranted to be free of defects in workmanship, design or material for a period of one year from date of startup or 18 months from delivery, whichever occurs first. If the equipment should fail during the warranty period due to a defective part(s), it shall be replaced in the machine and the unit(s) restored to service at no expense to the Owner.

PART 2 - PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. The pumping units required under this section shall be complete including pump, motor, and baseplate with proper alignment and balancing of the individual unit. 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. Ample room shall be provided for inspection, repairs, and adjustment.
- B. Pump bases shall be rigidly and accurately anchored into position, precisely leveled and aligned, so that the completed installation is free from stress or distortion. All necessary foundation bolts, plates, nuts and washers shall be furnished and installed by the Contractor and conform to the recommendations and instructions of the equipment Manufacturer. Anchor bolts, nuts, and washers shall be of Type 316 stainless steel. Grouting under bases after the equipment is set is included as work under this Section. Pumps and pump bases shall have adequate provisions to collect drainage and conduct it away to the nearest drain.
- C. A stainless steel nameplate giving the name of the manufacturer, the rated capacity, head, speed, and all other pertinent data shall be attached to the pump and motor.
- D. The pumping unit and electric motor shall be designed and constructed to withstand the maximum turbine run-away speed of the unit due to back flow through the pump. A statement of compliance and calculations demonstrating the ability of the units to meet this requirement shall be supplied with initial shop drawing submission.
- E. All pumps shall be designed and built for 24-hour continuous service at any and all points within the specified range of operation, without overheating, without cavitation, and without excessive vibration or strain.

- F. Mechanical equipment, including drives and electric motors shall be supplied and installed in accordance with applicable OSHA regulations. Type 316 stainless steel guards shall be installed on all rotating assemblies.
- G. All lubrication fittings shall be brought to the outside of all equipment so that they are readily accessible from the outside without the necessity of removing covers, plates, housings, or guards. Fittings shall be buttonhead type. Lubrication fittings shall be mounted together wherever possible. Pressure grease lubricated fittings shall be the "Zerk Hydraulic" type or the "Alemite" type. Housings of grease lubricated bearings shall be automatically exhausted to the atmosphere to prevent excessive greasing.

2.2 PUMP

- A. The cleaning pump shall be horizontal end suction type in conformance to ANSI B73.1
- B. The cleaning pump shall be Fybroc **Series 1500 size 4x6x13 or approved equivalent.**
- C. The pump shall meet the following conditions at full speed:
- D. Performance Requirements
 - 1. When operating at the maximum output speed of the motor, the pump shall have a characteristic performance curve, which meets all the minimum conditions listed in Table 11932-1. The pump and drive motor shall be capable of operating satisfactorily under the full range of conditions as defined by Table 11932-1. The secondary pump capacity, head and efficiency defined in Table 11932-1 shall be the "design point".
 - 2. Maximum motor speed shall not exceed that listed herein to satisfy the specified hydraulic duty requirements. The pump "design speed" shall be the maximum output speed of the motor when operating at the pump "secondary" capacity and head.
 - 3. With the pumping unit operating at full speed, the maximum brake horsepower required by the pump shall not exceed the maximum horsepower listed herein.
 - 4. Pump Design Requirements

FLOW (GPM)	HEAD (FT)	EFFICIENCY (%)	HORSEPOWER (HP)	Notes:
0	176	N/A	N/A	Deadhead Condition
600	160	70	40	Low Cleaning Flow
810	150	77	43	Duty Condition
1,040	140	78	48	High Cleaning Flow

- E. Certified Factory Tests:
 - 1. Factory testing in accordance with the standards of the Hydraulic Institute shall be required for each pump. The performance test acceptance grade shall be 1UE as defined by HI 14.6. Certified pump performance curves shall be submitted, including head, capacity, brake horsepower, and pump efficiency for the pump supplied. Certified data shall be provided to indicate the NPSH required by the pump at the primary operating point listed in Table 11932-1. Prior to conducting a pump test, notification of such test and a list of test equipment and test procedures shall be forwarded to the Owner and Engineer at least ten (10) working days before the scheduled test date. All electronic transducers, meters, gauges, and other test instruments shall be calibrated within forty-five (45) days of the scheduled test and certified calibration data shall be provided to the Engineer at least ten days prior to the Factory test. Differential pressure type flow meters, such as venturis shall have been calibrated within 5

years. Mechanical variation of the meter throat diameter will be accepted as verification of calibration validity.

2. Each pump shall be tested through the specified range of flow, and head/capacity/efficiency with curves plotted at speeds of 70%, 80%, 90% and 100% rated speed. During each test, the pump shall be run at each head condition for sufficient time to accurately determine discharge, head, power input, and efficiency. The pump will be tested with a suction head (including vapor pressure, velocity head friction loss and static suction head) as required to demonstrate the NPSH required by the pump at the primary operating point listed in Table 11932-1. If the pump fails to meet any specification requirement it will be modified until it meets all specification requirements.

2.3 PUMP CASING

- A. The pumps shall be FRP horizontal, end suction pumps in complete conformance with the latest version of ANSI Standard B-73.1.
- B. The casing shall be end suction, top centerline discharge. The casing shall be of reinforced fiberglass vinyl ester resin construction. The suction and discharge connections shall be flanged, rated at 150 pounds.

2.4 IMPELLER

- A. The impeller shall be semi open with integral shaft sleeve and will be made of reinforced fiberglass vinyl ester resin.

2.5 PUMP BEARINGS

- A. The bearings shall be steel, oil lubricated and protected from dust and moisture. All bearings shall be rated in accordance with ANSI B-1 O continuous-duty life of not less than 17,500 hours at the most severe loads imposed by the specified conditions.

2.6 SHAFTING

- A. Shaft shall be of solid one-piece, constructed of 316 stainless steel

2.7 MECHANICAL SEAL

- A. Mechanical seal shall be a single bellows cartridge seal that utilizes an internal flush.
- B. Mechanical seal shall be constructed with carbon and ceramic faces, 316 stainless steel metal parts and viton secondary seals.

2.8 COUPLINGS AND ACCESSORIES

- A. The shaft coupling between the motor shaft and the pump shaft is to be a flexible spacer coupling similar to the Woods Sure-Flex Spacer Coupling. The coupling must have a drop out center spacer to allow the shafts to be disconnected without disturbing the pump or motor. Coupling hubs are to be keyed into position on both shafts. The flexible rubber insert is to be EPDM. The coupling must be selected properly by horsepower rating and shaft size for the pump and motor combination specified.
- B. An OSHA approved 316 stainless steel coupling guard shall be furnished over the coupling for protection.

2.9 BEARING FRAME

- A. Bearing Frame shall be of cast iron construction and epoxy to prevent corrosion. It shall include a thrust bearing to absorb axial loads and radial bearings to absorb radial loads through the shaft from the impeller. Impeller adjustment shall be accomplished at the bearing frame through the use of jack screws and while the pump is completely assembled and installed.

2.10 BASE PLATES

- A. The pump and driver shall be mounted on a common FRP base with drip rim. Pump and driver shall be aligned and bolted in place prior to factory shipment. Final alignment must be performed at the jobsite in accordance with the standards of the Hydraulic Institute and the pump installation, operation and maintenance instructions. Base is to be grouted to eliminate vibration.
- B. The baseplate must incorporate an integral slopped drip pan. The baseplate must conform to ANSI/ASME Standard Dimensions and have pre-drilled holes for pump and motor mounting as well as grout holes. The baseplate design must provide sufficient rigidity to maintain alignment between pump and motor. Baseplate shall be equipped with jack bolts for alignment of pump and driver.

2.11 MOTORS

- A. Drive motor must be designed, manufactured, and tested in accordance with the latest revised edition of NEMA MG1.
- B. The motor will be the squirrel-cage induction, NEMA Design B, single speed, premium efficiency type.
- C. Operation of the cleaning pump shall not exceed the motor rating at any discharge head and flow condition.
- D. The motor nameplate horsepower rating must not be exceeded at any head-capacity point on the pump curve.
- E. The motors must conform to the following:
 - 1. Synchronous Speed **1,800 rpm**
 - 2. Horsepower **60 HP (Maximum)**
 - 3. Voltage, Phase & Frequency 460 volts, 3-phase, 60 Hz
 - 4. Mounting Horizontal
 - 5. Enclosure TEFC
 - 6. Design NEMA B
 - 7. Service Factor 1.15 For continuous duty
 - 8. Duty Cycle Continuous
 - 9. Ambient Temperature Rating 40 degrees C
 - 10. Winding Insulation Class F
 - 11. Temperature Rise Class B
 - 12. Starting Method Soft Starter
 - 13. Starting Current Manufacturers' standard
 - 14. Bearing Lubrication Sealed bearing
 - 15. Bearing Life 150,000 hours rating life is defined by AFBMA standard
- F. Provide motor modifications as follows:
 - 1. Space heaters to prevent moisture condensation, rating 120 volts, 200 watt maximum, ac.

2. Stainless steel screens over all air openings.
3. Stainless steel nameplate.
4. Motor must be premium efficiency type with minimum guaranteed efficiency of 93% as determined by NEMA test mg 1-12.53d (IEEE-112 test Method B).
5. The terminal housing for the motor is to be substantial fabricated steel or cast ferrous construction, and be rotatable in 90-degree steps, or suitable to receive a conduit from above, below or either side. The terminal housing is to be gasketed between frame and box. Grounding provisions must be made inside the terminal box by means of clamp type wire terminal.
6. The heater leads must be clearly identified with permanent tags.
7. Commercial test must be made on motor provided, including no-load current at rated voltage, high potential, and locked rotor current.
8. Provide three (3) temperature sensors embedded in the motor windings to sense excessive motor temperatures.

PART 3 - EXECUTION

3.1 GENERAL

- A. The pump and its components will be complete with a manufacturer's warranty for defects in materials and workmanship for a period of one year from the time the pump is placed into operation.

3.2 PERFORMANCE

- A. The manufacturer will warrant that the performance of all pumps will conform with manufacturer's certified pump performance curves. The pumps must operate within the tolerances of the Standards of the Hydraulic Institute. Curves published for similar pumps by another manufacturer will not be acceptable for this purpose.

3.3 SHOP PAINTING

- A. Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter. All nameplates shall be properly protected during painting. Motor shall be painted per specifications.

3.4 INSTALLATION

- A. Install all equipment in strict conformance with the manufacturer's specifications and industry standards. Perform all work in a workmanlike manner.
- B. Manufacturer's representative for pumps and valves shall inspect installation for correctness and compliance with manufacturers specifications and submit written certification that equipment is ready to be placed in service.
- C. No piping connecting any of the equipment will be jacked, pried or forced into position in any way. All piping must mate perfectly with the equipment it is attaching prior to installation of flange bolts or other connecting devices.

3.5 START-UP

- A. The pump manufacturer will have a qualified representative mate the pump to the motor and align the assembly. Manufacturer must provide a qualified representative to certify the pump performance.
- B. After initial start-up under the supervision of a qualified representative of the pump manufacturer, a preliminary running-in period will be provided for the Contractor to make field tests and necessary adjustments. The pumps will then operate for a period concurrent with the plant acceptance test.
- C. Field test pumps for conformance to specified operating conditions. Record initial flow, head, voltage and amperage for each power leg. Adjust tolerances, if necessary and retest. Confirm that the amplitude and frequency of vibration during pump operation is within the tolerances of the Standards of the Hydraulic Institute. Measure noise (dBA) adjacent to pump, and at 10 feet and 50 feet away.
- D. At the end of the specified period of operation, the pumps will be accepted if, in the opinion of the Engineer/Owner, the pumps have operated satisfactorily without excessive power input, wear, lubrication, or undue attention required for this operation, and if all rotating parts operate without excessive vibration or noise at any operating head.
- E. Pump and piping installed shall be disinfected in accordance with Section 02670 Pressure Testing and Disinfection prior to being placed in service.

3.6 OPERATIONS AND MAINTENANCE TRAINING

- A. The Contractor shall provide the services of qualified factory service representatives to instruct the Owner's personnel in the operation and maintenance of the pump and motor units, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the model of equipment furnished. This service shall consist of a one day visit for each type of similar pump and motor.
- B. The technical representative shall have at least two years of experience in pump equipment training and instruction. Training sessions shall be scheduled not less than two weeks in advance. Training materials shall be provided to each of the Owner's personnel in attendance and shall remain with the trainees.
- C. All costs for transportation, lodging, subsistence, and other incidental costs for the manufacturer's representative during the installation, testing, and instruction shall be borne by the Contractor at no cost to the Owner.

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SECTION 13442
FIELD INSTRUMENT PANELS

PART 1 - GENERAL

1.1 SCOPE

- A. This section includes all work to be furnished, installed, modified and testing of field-mounted instrument panels, complete. The panels shall be furnished complete, the mounting hardware, terminal strips, and all instruments, indicators, transmitters, etc. mounted in place. The panels included in this section are
 - 1. Train Status Panel (NF System Supplier Responsibility)
 - 2. Train Sample Panel (NF System Supplier Responsibility)
 - 3. Finished Water Status Panel
 - 4. Cleaning Control and Status Panel

1.2 RELATED REQUIREMENTS

- A. Section 13441 - Instrumentation Components
- B. Section 15100 - Piping and Valves

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The panels shall be fabricated from 1/2-inch thick PVC sheet, with machine cut openings for instruments, gauges and interconnecting tubing. The panels shall be wall or floor-mounted with mounting stands (or brackets) fabricated from PVC structural shapes, FRP structural shapes or 316SS angle. All fasteners shall be 316SS.

2.2 INSTRUMENTS AND EQUIPMENT

- A. The following describes the instruments required in each field panel. Instrument specifications are in related sections.
 - 1. Train Status and Sample panels specified in Section 11209, Membrane Softening System.
 - 2. Finished Water Status
 - a. pH Analyzer/Transmitter with sensor
 - b. Five (5) Rotameters, pH, chlorine residual (x2), fluoride, and Conductivity
 - c. Chlorine Residual Analyzer
 - d. Conductivity transmitter and sensor
 - e. Fluoride transmitter and sensor
 - f. PVC Junction boxes, NEMA 4 rated, equipped with terminal strips for 4-20mA and 110V wiring.
 - 3. Cleaning Control and Status Panel
 - a. Instrument Flow Meter – Conductivity
 - b. pH Analyzer/Transmitter with sensor

- c. CIP tank level transmitters (x2)
- d. PVC Junction boxes, NEMA 4 rated, equipped with terminal strips for 4-20mA and 110V wiring.

PART 3 - EXECUTION

3.1 SUMMARY

- A. Piping shall be designed with unions so that instruments may be easily disconnected and removed from the panel. Tubing used on the panel shall be 1/2" OD polypropylene with "Fastite" fittings.
- B. All interconnecting conduit shall be PVC corrugated flexible tubing, with compatible PVC conduit fittings. Separate conduits shall be provided for 4-20mA and 110V circuits.

- END OF SECTION -