

SECTION 221123.13 - DOMESTIC-WATER PACKAGED BOOSTER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Multiplex, constant-speed booster pumps.

B. Related Requirements:

1. Section 221123 "Domestic Water Pumps" for domestic-water circulation pumps.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For booster pumps.

C. Delegated-Design Submittal: For domestic-water packaged booster pumps.

1. Include design calculations for selecting vibration isolators and for designing vibration isolation bases.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for booster pumps, accessories, and components, from manufacturer.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

2.2 MULTIPLEX, CONSTANT-SPEED BOOSTER PUMPS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Bell & Gossett; a Xylem brand.
 - 2. Canariis Corporation.
 - 3. Quantum-Flo.
 - 4. SyncroFlo, Inc.
 - 5. Or approved equal
- B. Description: Factory-assembled and -tested, fluid-handling system for domestic water, with pumps, piping, valves, specialties, and controls, and mounted on base.
- C. Pumps:
 - 1. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, close-coupled, single-stage, overhung-impeller, centrifugal pump.
 - 2. Casing: Radially split; stainless steel.
 - 3. Impeller: Closed, stainless steel; statically and dynamically balanced and keyed to shaft.
 - 4. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve and deflector.
 - 5. Seal: Mechanical.
 - 6. Orientation: Mounted vertically.
- D. Motors: Single speed, with grease-lubricated or pre-greased, permanently shielded, ball-bearings. Select motors that will not overload through full range of pump performance curve.
- E. Piping: Stainless-steel pipe and fittings Stainless-steel pipe and fitting headers and copper tube and copper fittings between headers and pump.
- F. Valves:
 - 1. Shutoff Valves NPS 2-1/2 and Larger: lug-type butterfly valve, in each pump's suction and discharge piping and in inlet and outlet headers.
 - 2. Check Valves NPS 2-1/2 and Larger: Silent type in each pump's discharge piping.
 - 3. Thermal-Relief Valve: Temperature-and-pressure relief type in pump's discharge header piping.
- G. Dielectric Fittings: With insulating material to isolate joined dissimilar metals.
- H. Control Panel: Factory installed and connected as an integral part of booster pump; automatic for multiple-pump, constant-speed operation, with load control and protection functions.

1. Control Logic: Solid-state system with transducers, programmable microprocessor, and other devices in the controller.
2. Motor Controller: NEMA ICS 2, general-purpose, Class A, full-voltage, combination-magnetic type with undervoltage release feature, motor-circuit-protector-type disconnect, and short-circuit protective device.
 - a. Control Voltage: 24 V dc, with integral control-power transformer.
3. Enclosure: NEMA 250, Type 3R.
4. Motor Overload Protection: Overload relay in each phase.
5. Starting Devices: Hand-off-automatic selector switch for each pump in cover of control panel, plus pilot device for automatic control.
 - a. Duplex, Automatic, Alternating Starter: Switches lead pump to lag main pump and to two-pump operation.
 - b. Triplex, Sequence (Lead-Lag-Lag) Starter: Switches lead pump to one lag main pump and to three-pump operation.
6. Pump Operation and Sequencing: Current- or pressure-sensing method.
 - a. Time Delay: Controls pump on-off operation; adjustable from 1 to 300 seconds.
7. Instrumentation: Suction and discharge pressure gauges.
8. Lights: Running light for each pump.
9. Alarm Signal Device: Sounds alarm when backup pumps are operating.
 - a. Time Delay: Controls alarm operation; adjustable from 1 to 300 seconds, with automatic reset.
10. Thermal-bleed cutoff.
11. Low-suction-pressure cutout.
12. High-suction-pressure cutout.
13. Low-discharge-pressure cutout.
14. High-discharge-pressure cutout.
15. Direct Digital Control (DDC) System for HVAC: Provide auxiliary contacts for interface to BACnet DDC system. DDC systems are specified in Section 230923 "Direct-Digital Control (DDC) System for HVAC." Include the following:
 - a. On-off status of each pump.
 - b. Alarm status.

- I. Base: Structural steel.

2.3 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors.
 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical

devices and connections specified in NFPA 70.

2.4 SOURCE QUALITY CONTROL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- B. ASME Compliance: Comply with ASME B31.9 for piping.
- C. UL Compliance for Packaged Pumping Systems:
 - 1. UL 508, "Industrial Control Equipment."
 - 2. UL 508A, "Industrial Control Panels."
 - 3. UL 778, "Motor-Operated Water Pumps."
 - 4. UL 1995, "Heating and Cooling Equipment."
- D. Booster pumps shall be listed and labeled as packaged pumping systems by testing agency acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Booster-Pump Mounting:
 - 1. Install booster pumps on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - 2. Comply with requirements for vibration isolation and seismic-control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
 - 3. Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."
- B. Support connected domestic-water piping so weight of piping is not supported by booster pumps.
- C. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.2 PIPING CONNECTIONS

- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Booster-Pump Piping Connections: Connect domestic-water piping to booster pumps. Install suction and discharge pipe equal to or greater than size of system suction and discharge headers.

1. Install shutoff valves on piping connections to booster-pump suction and discharge headers. Install ball, butterfly, or gate valves same size as suction and discharge headers. Comply with requirements for general-duty valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."
2. Install union, flanged, or grooved-joint connections on suction and discharge headers at connection to domestic-water piping. Comply with requirements for unions and flanges specified in Section 221116 "Domestic Water Piping."
3. Install valved bypass, same size as and between piping, at connections to booster-pump suction and discharge headers. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."
4. Install flexible connectors, same size as piping, on piping connections to booster-pump suction and discharge headers. Comply with requirements for flexible connectors specified in Section 221116 "Domestic Water Piping."
5. Where installing piping adjacent to booster pumps, allow space for service and maintenance.

3.3 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

3.4 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.5 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
- B. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
 - 1. Perform visual and mechanical inspection.
 - 2. Leak Test: After installation, charge booster pump and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start booster pumps to confirm proper motor rotation and booster-pump operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Pumps and controls will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.7 ADJUSTING

- A. Adjust booster pumps to function smoothly, and lubricate as recommended by manufacturer.
- B. Adjust pressure set points.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting booster pump to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain booster pumps.

END OF SECTION 221123.13