



DIVISION 15- MECHANICAL

Section 15540 - HVAC Pumps and Specialties

1.00 PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

- A. Provide pumps and required system trim for heating, chilled water, and dual temperature water systems including all related appurtenances for a complete and operating systems.

1.02 SECTION INCLUDES:

- A. Double Suction, Horizontal Split Case Pump (Base Mounted)

1.03 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to these Sections.

- Section *** - Alignment of Rotating Equipment
- Section *** - Cast-in-Place Concrete
- Section *** - Mechanical General Requirements
- Section *** - Supports, Anchors, and Sleeves
- Section *** - Motors and Starters
- Section *** - Drives
- Section *** - Mechanical Identification
- Section *** - Vibration Isolation
- Section *** - Piping Insulation
- Section *** - Equipment Installation
- Section *** - Hydronic Piping and Specialties
- Section *** - Testing, Adjusting, and Balancing
- Section *** - Meters and Gauges
- Section *** - Electrical

1.04 QUALITY ASSURANCE:

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.
- B. Ensure pump operation at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate to ANSI/HI 9.6.3.1 (2017) standard for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pump NPSH shall conform to the ANSI/HI 9.6.1-2017 standard for *Rotodynamic Pumps - Guideline for NPSH Margin*.
- C. Ensure pump pressure ratings are at least equal to system's maximum operating pressure at point where installed, but not less than specified.
- D. Equipment manufacturer shall be a company specializing in manufacture, assembly, and field performance of provided equipment with a minimum of 20 years' experience.
- E. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New pump start-up shall be for the purpose of determining pump alignment, lubrication, voltage, and amperage readings. All proper electrical connections, pump's balance, discharge and suction gauge readings, and adjustment of head, if required. A copy of the start-up report shall be made and sent to both the contractor and to the Engineer.

1.05 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect equipment before, during, and after installation.
- B. Replacement and Repair: All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by the Architect Engineer.

1.06 REGULATORY REQUIREMENTS:

- A. Conform to Health/Life Safety Code for Public Schools as applicable
- B. Conform to International Mechanical Code
- C. Conform to BOCA National Building Code
- D. Conform to BOCA National Fire Protection Code
- E. Conform to State Plumbing Code
- F. Conform to National Electric Code NFPA 70
- G. Conform to State Accessibility Code as applicable
- H. Conform to applicable ANSI/HI standards
- I. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.
- J. Conforms to EISA

1.07 SUBMITTAL:

- A. Submit each item in this article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Submit manufacturer's installation instructions under provisions of General Conditions and Division 1.
- C. Product Data including certified performance curves and rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate pump's operating point on curves.
- D. Complete Package information Product Data including:
 - System summary sheet (where applicable)
 - Sequence of Operation
 - Submittal drawing indicating dimensions, required clearances and location and size of each field connection
 - Power and control wiring diagram
 - System profile analysis including pump curves, system curve, and variable speed pump curves (where applicable)
 - Pump data sheets - Rated capacities of selected models and indication of pump's operating point on curves.
 - Submittals on furnished specialties and accessories
 - Submittals must be specific to this project. Generic submittals will not be accepted
- E. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.

1.08 OPERATION AND MAINTENANCE DATA:

- A. Submit Operation and Maintenance information under provisions of Division 15 "Mechanical General Requirements" and the provisions of the General Conditions and Division 1.
- B. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts lists.
- C. Under provisions of commissioning documentation; testing of pumps, as well as training of owner's operation and maintenance personnel may be required in cooperation with the commissioning consultant.

1.09 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to the site in such a matter as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs if required for handling. Materials damaged by the elements should be packaged in such a matter that they could withstand short-term exposure to the elements during transportation.
- B. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

1.10 WARRANTY:

- A. Provide a minimum One (1) year warranty on materials and installation.

1.11 EXTRA MATERIALS:

- A. Provide items from recommended spares list in required quantities for each model type of primary pump scheduled.

PART 2 - PRODUCTS

- A. The specifying engineer reserves the right to specify a primary supplier / lead spec manufacturer on all supplied schedule and specification documents. These primary suppliers have lead their respective industry in research and development and their products have had proven track records in the field. These primary suppliers, in the opinion of this engineering firm, produce a superior product to the alternately listed manufacturers. The contractor may choose to supply equivalent equipment as manufactured by the alternately specified manufacturer. This alternately specified equipment shall be supplied on a deduct alternate basis and based on the approval of the supplied alternate manufacturer's submittals.

The use of a primary supplier and deduct alternates protects the specifying engineer's design concept, but allows for a check-and-balance system to protect the post-commissioning owner.

2.09 DOUBLE SUCTION, HORIZONTAL SPLIT CASE PUMPS (BASE MOUNTED):

A. Manufacturer:

1. Contractor shall furnish and install new double suction horizontal split case pumps for chilled water and hot water heating systems as indicated on the drawings. Pumps shall be as manufactured by **Bell & Gossett** under base bid. Equivalent units as manufactured by others may be submitted as deduct alternates. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule drawings.

B. Double Suction, Horizontal Split Case Pump (Base Mounted):

1. The pumps shall be long coupled, base mounted, single stage, double suction, horizontally split case design, in cast iron stainless fitted construction specifically designed for quiet operation. Suitable standard operations at 250°F (120°C) and 175 psi (12 bar) working pressure or optional operations up to 400 psi (28 bar) working pressures. Working pressures shall not be de-rated at temperatures up to 250°F (120°C). The pump internals shall be capable of being serviced without disturbing piping connections or electrical motor connections, and the pump's internal seals and bearings shall be serviceable

- without disturbing the upper casing half when maximum working pressure is less than or equal to 175 psi (12 bar).
2. A bearing housing shall supply support for a pair of heavy-duty regreaseable ball bearings. An inboard single row bearing shall absorb thermal expansive forces while an outboard single row bearing shall be clamped in place to absorb both radial and thrust loads and keep the rotating element in proper axial alignment. Bearings shall be replaceable without disturbing the system piping, the upper casing half, and shall be regreaseable without removal of the bearings from the bearing housing. Ratio of length to diameter of the shaft design shall be no greater than 14 to minimize shaft deflection and maximize bearing and seal lives.
 3. The pump shaft shall be a solid heat treated 420 stainless steel shaft.
 4. Pump shall be equipped with a pair of internally self flushing mechanical seal assemblies in direct contact with the pump shaft. Seal assemblies shall be unbalanced elastomeric seals having a stainless steel spring, and be of a carbon face rotating against a stationary silicon carbide face with an EPDM elastomeric bellow. Mechanical seals shall be replaceable without disturbing the upper casing half and system piping when suction pressure less than or equal to 175 psi (12 bar).
 5. Impeller shall be of the enclosed double suction type made of 304 SS, both hydraulically and dynamically balanced to grade G6.3, keyed to the shaft and fixed in the axial position by retaining ring.
 6. A flexible spacer type coupling, capable of absorbing torsional vibration, shall be employed between the pump and motor. On variable speed applications the coupler sleeve shall not be constructed of a nylon material to maximize performance life.
 7. An OSHA and ANSI rated coupling guard shall shield the coupling during operation. Coupler guard shall be dual rated ANSI B11.19, OSHA 1910.219 and CE compliant coupling guard and contain viewing windows for inspection of the coupling. No more than 0.25 inches [6 mm] of either rotating assembly shall be visible beyond the coupling guard. Coupling guard shall have an adjustable mount to the baseplate. Coupling guard shall be provided with viewing slots for visibility of rotating coupling components during pump operation.
 8. Pump volute shall be of a class 35 cast iron [rated for 175 psi (12 bar) maximum working pressure] or class 65-45-12 ductile iron [rated for 400 psi (28 bar) maximum working pressure] axially-split design with flanges [175 psi (12 bar) casing drilled with 125# ANSI / PN 16 companion flanges or optional 400 psi (28 bar) casing working pressures are drilled with 250# ANSI / PN25 or PN40 flanges] and mounting feet integral cast into the bottom half of the casing. Suction and discharge flanges shall be on a common centerline in both the horizontal and vertical planes, and the volute shall include: priming port, gauge ports on bosses near nozzles, and vent and drain ports. The upper half casing shall be capable of being removed without disturbing piping connections or electrical motor connections. Bearings housings should include ports for measurement of temperature and vibration (in two axes). Bearing temperature measurement shall be measured at outer raceway of the bearing.
 9. The pump seal flushing shall be internal within the pump casing.

10. Motors shall meet scheduled horsepower/kW, speed, voltage, and enclosure design. Pump and motors shall be factory aligned, and shall be realigned after installation by the manufacturer's representative. Motors shall be non-overloading at any point on the pump curve within POR and shall meet NEMA/IEC specifications and conform to the standards outlined in EPACT 92.
11. Base plate shall be of structural steel or fabricated steel channel configuration fully enclosed at sides and ends, with securely welded cross members and fully open grouting area (for field grouting). The minimum base plate stiffness shall conform to ANSI/HI 1.3.8-2013 for *Horizontal Baseplate Design* standards. Base plate shall be fitted with dog-point jacking screws for optimal motor alignment.
12. Pump rotation shall be right-hand or left-hand with respect to the discharge flange as viewed from the pump's outboard/non-drive end.
13. The pump(s) selected shall conform to ANSI/HI 9.6.3.1-2017 standards for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pump NPSH shall conform to the ANSI/HI 9.6.1-2017 standards for *Rotodynamic Pumps - Guideline for NPSH Margin*.
14. The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 9.6.4-2016 standard for *Rotodynamic Pumps for Vibration Measurements and Allowable Values*, for recommended acceptable unfiltered field vibration limits for pumps with rolling contact bearings.
15. Pump manufacturer shall be ISO-9001 certified.
16. Each pump shall be factory hydrostatically tested to 1.5 times maximum working pressure for 10 minutes per Hydraulic Institute standards and name-plated before shipment. It shall then be thoroughly cleaned and painted with at least one coat of high grade paint prior to shipment.

C. Accessories:

- A. Where noted on schedule pumps shall be provided with internal bronze casing wear rings, special shaft materials, special impeller materials or impeller wear rings, or non-spacer couplings.
- B. Where noted on schedule either unbalanced seals of Silicon carbide/silicon carbide/EPDM, Carbon/silicon carbide/FKM, Silicon carbide/silicon carbide/FKM
- C. Where noted on schedule pumping equipment may require one or all of the following tests: Certified Lab tests (unwitnessed or witnessed), NPSHR, or temperature testing.
- D. Where noted on schedule pumping equipment may require non-grouted, drip pan, solid top, or drip rim base plates.
- E. Where noted on schedule pump may require special coating (internal or external).
- F. Where noted on schedule impeller or rotating element may require balancing to G2.5 (impeller) or G1.0 (rotating element).

END OF SECTION



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