

SECTION 23 2123 - PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Close-coupled, in-line centrifugal pumps.
 - 2. Close-coupled, end-suction centrifugal pumps.
 - 3. Separately coupled, horizontal, in-line centrifugal pumps.
 - 4. Separately coupled, vertical, in-line centrifugal pumps.
 - 5. Separately coupled, base-mounted, end-suction centrifugal pumps.
 - 6. Pump specialty fittings

1.3 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
- C. Operation and maintenance data.
- D. Grooved joint couplings and fittings specifically identified with the applicable style or series number.
- E. Northwestern University Maintenance Requirement Forms, see Division 01.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. UL Compliance: Comply with UL 778 for motor-operated water pumps.
- C. Source Limitations: Obtain hydronic pumps through one source from a single manufacturer.

- D. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by the same manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.
- E. All grooved couplings shall be installed strictly according to grooved manufacturer's instructions including torque verification and specific lubrication as published.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store pumps in dry location.
- C. Retain protective covers for flanges and protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with pump manufacturer's written rigging instructions.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.7 SPECIAL WARRANTY

- A. Five (5) years, see Division 01.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Pump motors shall be 1750 rpm maximum unless otherwise scheduled on drawings and sized for non-overloading service.
- B. Pump impeller shall be shaved to a minimum of **[110%]** **[120%]** of design flow at the required pump head after balancing.
- C. Pumps motors operated by Variable Frequency Drives shall have pump impellor balanced for variable speed operation.
- D. All pumps to be provided with permanently affixed nameplates which include impeller diameter, rated capacity in gpm, rated head in feet, rpm, and motor horsepower.
- E. Pumps to be maintenance free, or as close to maintenance free. Of course, this depends on size and performance requirements.

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2.2 MANUFACTURERS FOR CHICAGO CAMPUS

A. Pump Manufacturers: Subject to compliance with the requirements, provide products by one of the following:

1.

4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Equal to John Crane Type 21.
5. Pump Bearings: Permanently lubricated ball bearings through 5 hp. Over 5 hp : grease-lubricated ball bearings.
6. Motor: Single speed, with permanently lubricated ball bearings, unless otherwise indicated; rigidly mounted to pump casing with integral pump support. Comply with requirements in Division 23 Section "Motors."

2.6 SEPARATELY COUPLED, HORIZONTAL, IN-LINE CENTRIFUGAL PUMPS

- A. Description: Factory-assembled and tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally. Rate pump for 125-psig minimum working pressure and a continuous water temperature of 225 deg F.
- B. Pump Construction:
 1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, and threaded **[companion-flange] [union end]** connections.
 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
 3. Pump Shaft: **[Steel, with copper-alloy shaft sleeve] [Stainless steel]**.
 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and **[Buna-N] [EPT]** bellows and gasket. Include water slinger on shaft between motor and seal.
 5. Pump Bearings: Permanently lubricated ball bearings.
- C. Shaft Coupling: **[Molded rubber insert with interlocking spider] [Interlocking frame with interconnecting springs]** capable of absorbing vibration.
- D. Motor: Single speed, with **[permanently lubricated ball] [oil-lubricated sleeve]** bearings, unless otherwise indicated; and **[resiliently] [rigidly]** mounted to pump casing. Comply with requirements in Division 23 Section "Motors."

2.7 SEPARATELY COUPLED, VERTICAL, IN-LINE CENTRIFUGAL PUMPS

- A. Description: Factory-assembled and tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted vertically. Rate pump for **[125-psig] [175-psig] [250-psig]** minimum working pressure and a continuous water temperature of **[200 deg F] [225 deg F] [250 deg F]**.
- B. Pump Construction:
 1. Casing: Radially split, cast iron, with **[replaceable bronze wear rings,]** threaded gage tappings at inlet and outlet, and threaded **[companion-flange] [union end]** connections.
 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 3. Pump Shaft: **[Steel, with copper-alloy shaft sleeve] [Stainless steel]**.
 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and **[Buna-N] [EPT]** bellows and gasket. Include water slinger on shaft between motor and seal.

5. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 6. Pump Bearings: [**Permanently lubricated ball bearings**] [**Oil lubricated; bronze-journal or thrust type**].
- C. Shaft Coupling: Axially split spacer coupling.
- D. Motor: Single speed, with [**permanently lubricated**] [**grease-lubricated**] ball bearings, unless otherwise indicated; rigidly mounted to pump casing with lifting eye and supporting lugs in motor enclosure. Comply with requirements in Division 23 Section "Motors."
- 2.8 SEPARATELY COUPLED, BASE-MOUNTED, END-SUCTION CENTRIFUGAL PUMPS
- A. Description: Factory-assembled and tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for 175-psig minimum working pressure and a continuous water temperature of 225 deg F.
- B. Pump Construction:
1. Casing: Radially split, cast iron, with drain plug at bottom and air vent at top of volute, threaded gage tappings at inlet and outlet.
 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw.
 3. Pump Shaft: Stainless steel.
 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Equal to John Crane Type 21.
 5. Pump Bearings: Permanently lubricated ball bearings through 5 hp. Over 5 hp : grease-lubricated ball bearings.
- C. Shaft Coupling: Molded rubber insert and interlocking spider capable of absorbing vibration. Couplings shall be drop-out type to allow disassembly and removal without removing pump shaft or motor [

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- H. Install grooved piping products in accordance with the manufacturer's guidelines and recommendations. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove.

- I. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. A field representative shall provide on-site training for contractor's field personnel

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