SECTION 23 21 23

HYDRONIC PUMPS

PART 1: GENERAL

1.1 PURPOSE

A. This guideline is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. PSP is to apply the principles of this section such that the University of Texas at Arlington (UTA) may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be approved by UTA and may require justification through Life Cycle Cost (LCC) analysis and submitted to UTA for approval.

1.2 SUBMITTALS

A. Submit the following product data:

1. Certified pump curves showing performance characteristics with pump and system operating point.

2. Manufacturer's installation instructions.

3. Manufacturer's maintenance instructions including parts list.

4. Warranty information and certificates.

1.3 **LESSONS LEARNED AND DESIGN CONSIDERATIONS**

A. Finalize flush plans/procedures for chilled water lines on campus (See Section 23 21 00.1).

1. A third party chemical treatment subcontractor is to perform the flush.

2. An outside pump will need to be used as the on-site pumps are typically not large enough for the requirements of the flush.

3. Establish flushing schedule in advance.

B. Chilled water systems serving non HVAC secondary loads shall be independently circuited from the primary chilled water system within the building through a plate and frame heat exchanger. The heat exchanger will be sized to achieve the required primary chilled water differential temperature requirements stated in 23 00 00. The circulating pump shall be located in easily accessible areas for service and not above ceilings. Secondary loads shall be consolidated into a minimum number of separate chilled water loops. Aggregation of equipment on such loops shall be approved in advance by UTA.

C. Provide N + 1 capacity for hydronic systems. Generally two pumps at 100% flow capacity each.

D. Provide variable speed drives on all hydronic pumps over 3 HP. See 26 29 13 for variable speed drive guidelines.

E. Select pumps on the ascending side of the efficiency curve.

F. In all cases the PSP shall evaluate system conditions and select the optimum pump type and configuration based on efficiency and pump characteristics.

1. Recommend in-line circulating pump or closed coupled end suction pumps for flows up to 50 GPM.

2. Recommend vertical in line pumps for circulating systems with flows between 50 and 500 GPM.

3. Recommend horizontal split case, double suction pumps for flows exceeding 500 GPM.

G. Manufacturer's installation instructions shall be followed. Where the requirements of the specification are in conflict with the installation instructions, the contractor will bring the issue to the attention to the appropriate design professional.

H. Provide pumps to operate at 1750 RPM unless directed otherwise.

I. Pumps shall be selected to be non-overloading over the entire pump curve. The pumps shall be selected such that the impeller size is 90% or less than the maximum impeller size catalogued.

J. Provide pumps free from flashing and cavitation at all flowrates between 25% and 125% of design flow under the suction conditions.

K. Provide manufacturers recommended maintenance clearances and maintain a minimum of 3 feet around equipment for service.

L. Design pipe changes off pumps using long radius reducing elbows or eccentric reducers to reduce turbulence. Provide piping support such that the piping weight is not transferred to pump flanges or casing. Provide support under elbows attached to inertial bases on pump suction and discharge.

M. Hot water heating systems and chilled water systems will have 100% redundant pumps.

PART 2 - PRODUCTS

2.1 GENERAL

A. This product section is intended to inform the PSP on the minimum standard of quality that should be incorporated in new designs. The PSP should evaluate these standards and incorporate or make additional requirements per project specific requirements. Where the PSP considers any requirement listed not to be applicable or incompatible with the project design intent should be discussed with UTA Office of Facilities Management.

2.1 PUMPS:

Manufacturers: Grundfos, Paco, Armstrong, Taco, and Bell and Gossett

A. IN-LINE CIRCULATOR PUMPS:

1. Horizontal shaft single stage, direct connected with multiple speed motor for inline mounting.

2. Provide maintenance free units design for the working pressure of the piping system and 225° F continuous water temperature.

3. Wetted surfaces shall be non-ferrous materials.

4. Body: Cast iron with epoxy corrosion resistant finish with bronze or stainless steel fitted construction. Flanged connections.

5. Shaft: Stainless steel.

6. Motor: Impedance protected, multiple speed with external speed selector.

7. Impeller: Brass enclosed type, hydraulically and dynamically balanced, and keyed to shaft.

B. END SUCTION PUMPS:

1. Provide horizontal base mounted, single stage, vertical split case, flexible coupling, designed for the working pressure of the piping system.
2. Casing: Pump casing will be rated for 175 psig working pressure. Casing will have gauge ports at nozzles and vent and drain ports at top and bottom of casing.
3. Shaft: Steel with replaceable shaft sleeve.
4. Shaft Sleeves: 316 Stainless Steel with Buna O Ring Sealing between the impeller and the hub; threaded to tighten when rotating in normal service direction.
5. Impeller: cast bronze, enclosed, dynamically balanced and keyed to the shaft by locking cap screw.
6. Bearings: Pump bearing housing shall have heavy duty greasable ball bearings, replaceable without disturbing the piping connections.
7. Seal: The liquid cavity will be sealed off with an internal flushed mechanical seal with ceramic seat of at least 98% alumina oxide content, carbon seal ring suitable for continuous operation at 225 degrees F. A replaceable shaft sleeve shall completely cover the wetted area under the seal.

C. HORIZONTAL SPLIT CASE PUMPS:

1. Provide centrifugal, single stage, base mounted, direct connected.
2. Casing: Cast iron, ANSI flanges rated for the working pressure of the piping system, and tapping for gage and drain connections with epoxy corrosion resistant finish.
3. Shaft: 316 Stainless Steel.
4. Shaft Sleeves: Bronze or Stainless Steel.
5. Motor: Non-overloading at any point on pump curve, open, drip-proof, oil-lubricated journal bearings, resilient mounted construction, and built-in thermal overload protection on single phase motors.
6. Impeller: Bronze
7. Seal: Mechanical Seal with ceramic seat.
8. Drive: Flexible coupling with coupling guard.
9. Baseplate: Cast iron or welded steel, with epoxy corrosion resistant finish.

D. VERTICLE IN-LINE PUMPS:

1. Description: factory assembled and tested, centrifugal, overhung impeller, close coupled in line pump. Designed for installation with pump motor shafts mounted vertically.
2. The bearing housing shall supply support for heavy duty single row permanently lubricated ball bearings. The bearings shall be capable of absorbing both radial and axial thrust loads and maintaining the rotating element in axial alignment.

3. Rate pump for 175 psig minimum working pressure and a continuous water temperature of 225 degrees F.

4. The impeller shaft shall be solid 416 stainless steel.

5. Pump shall be equipped with internally flushed mechanical seal assembly mounted on 304 stainless steel sleeves. No external flushing lines.

6. Shaft Sleeves: Bronze or Stainless Steel.

7. Motor: Non-overloading at any point on pump curve, open, drip-proof, oil-lubricated journal bearings, resilient mounted construction, and built-in thermal overload protection on single phase motors.

8. Impeller shall be enclosed double suction type made from low zinc bronze and keyed to the shaft.

9. A coupling, capable of absorbing torsional vibration and in operating in variable speed applications shall be employed between the pump and motor. Allow for removal of pumps wetted end without disturbing pump volute or movement of the pumps motor and electrical connections.

10. Baseplate: Cast iron or fabricated steel with integral drain.

PART 3: EXECUTION

A. Contractor to verify equipment as it is unloaded from delivery trucks as the correct equipment from the approved submittals and construction documents.

B. Provide base-mounted pumps on minimum of 4" high concrete base equal or greater than 3 times total weight of pump and motor, with anchor bolts poured in place.

C. Provide check valve and isolation butterfly valve on discharge side of pumps.

D. Provide Y type strainer, suction diffuser and shutoff valve on suction side of pumps.

E. Install pressure gauges on inlet and outlet of pump.

END OF SECTION 23 21 23