SECTION 23 20 00 – HVAC PIPING AND PUMPS

PART 1: GENERAL

1.1 PURPOSE:

A. This standard is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. The responsibility of the engineer is to apply the principles of this section such that the University of Texas at Dallas may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be justified through LCC analysis and submitted to UT Dallas for Approval.

1.2 REFERENCES:

A. ASME Compliance: Fabricate and install hydronic piping in accordance with ASME B31.9 "Building Services Piping".

B. HI Compliance: Design, manufacture, and install pumps in accordance with HI "Hydraulic Institute Standards."

C. UL Compliance: Design, manufacture, and install pumps in accordance with UL 778 "Motor Operated Water Pumps."

D. NEMA Compliance: Provide electric motors and components which comply with NEMA standards.

1.3 REQUIREMENTS:

A. Avoid 3½" and 5" pipe in chilled-water systems; except that 5" chilled water meters are acceptable.

B. Drains and vents on chilled-water distribution piping shall consist of Schedule 80 thread-o-lets with stainless steel pipe nipples and bronze gate valves. Where dissimilar metals are present a dielectric connector is required.

C. All taps shall be constructed of ¾" Schedule 80 Thread-o-Let, ¾" 304/316 stainless steel nipples, and ¾" bronze gate valve

D. Provide means for access where valves and fittings are not exposed. Size, location and dimensions shall be approved in advance by the Owner.

E. Chilled water systems serving secondary loads shall be independently circuited from the primary chilled water system within the building and serve mechanical systems such as standalone computer HVAC, refrigeration equipment, etc. Each loop shall be provided with independent circulating pump. Pump shall be located in easily accessible areas for service and not above ceiling. Secondary loads shall be consolidated into a minimum number of separate chilled water circulating loops. Aggregation of equipment on such loops shall be approved in advance by the University.

F. Chilled water design supply water temperature shall be 42° F, with a minimum return water temperature of 58° F to maximize the usable lifetime (optimize pipe size of existing piping) of water systems. This shall be accomplished without the use of blending stations.

G. Provide sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more hydronic terminals or equipment connections

H. Provide drain valves on each mechanical equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and at any low point required to completely drain hydronic-piping system.

I. Route groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

J. Select pumps on the ascending side of the efficiency curve. All pumps shall be non-overloading.

K. 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 pumps or close-coupled end suction pumps for low flow (up to 50 GPM) circulating systems.

2. Recommend base-mounted end suction pumps for circulating systems with flow rates between 50 and 500 GPM.

3. Recommend horizontal split case, double-suction pumps for applications with flow rates exceeding 500 GPM.

4. Vertical in-line pumps shall be considered for applications with limited floor space and shall require UT Dallas approval

L. Provide pumps design to operate to 1,750 RPM unless directed otherwise.

M. Provide pumps free of flashing and cavitation at all flow rates between 25% and 125% of design flow under the suction conditions of the pump installation.

N. Provide pumps sized for critical speed of at least 115% of operating speed.

O. 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.

P. Provide manufacturer's recommended clearances as a minimum. Indicate on Drawings required access space around pumps for service.

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

R. Provide a minimum of 5 straight pipe diameters at pump inlet connections. Suction diffusers only allowed if space constraints require their use. Provide line size isolation valve and strainer on pump suction piping. Provide line sized, spring-loaded silent check valve and isolation valve on pump discharge piping.

PART 2: PRODUCTS

2.1 PIPING:

A. Pipe Size ½" (connections to fan coil units): Type "L" copper w/ wrought copper fittings.

B. Pipe Size 2" and Smaller: Black steel pipe; Schedule 80; Class 150 malleable iron fittings with threaded joints.

C. Pipe Size 2½" and Larger: Black steel pipe, Schedule 80, wrought-steel butt- welded fittings with welded joints. Mechanical/grooved fittings and couplings may be specified by the PSP.

D. For hot water reheat systems type L Copper is acceptable. All joints shall be brazed.

2.2 PIPING SPECIALTIES:

A. Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish cast brass or sheet brass pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

B. Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for working pressure of the piping system, with type 304, stainless steel screens.

C. Provide dielectric unions as recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.

D. Sleeve Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.3 PUMPS:

A. In-Line Circulator Pumps:

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

2. Wetted surfaces shall be non-ferrous materials.

3. Body: Cast iron with bronze or stainless steel fitted construction.

4. Shaft: Stainless steel; metal impregnated carbon thrust bearing.

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. Coupling: Self-aligning, flexible coupling.

7. Impeller: Bronze or stainless steel enclosed type, hydraulically and dynamically balanced, and keyed to shaft.

B. Base-Mounted 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: Cast iron, ANSI flanges rated for the working pressure of the piping system and tappings for gage and drain connections.

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 Ring: Bronze; easily replaceable.

6. Construction: Bronze fitted.

7. Seal: Mechanical Seal with ceramic seat.

C. Horizontal Split Case Pump:

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.

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 steel.

D. Vertical Inline Pump:

1. Provide centrifugal, single stage, close coupled in-line back pullout design.

2. Casing: Cast iron, ANSI flanges rated for the working pressure of the piping system, and tapping for gage and drain connections.

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 Ring: Bronze, statically and dynamically balanced, and keyed to shaft.

7. Seal: Mechanical Seal with ceramic seat.

8. Coupling: Axially split spacer coupling.

PART 3: EXECUTION

3.1 PIPE TESTING PROCEDURES:

A. Refer to Appendix for hydronic pipe testing procedures.

END OF SECTION 23 20 00