SECTION 23 10 00 - HVAC SYSTEMS - GENERAL

1.1 HVAC SYSTEMS GENERAL

A. All pneumatic controls shall be marked Hot Deck, Cold Deck, Mixed Air, etc. See Identification of Piping Systems paragraph below.

B. Design systems so that all components requiring access are easy to reach for maintenance. These components include, but are not limited to, shut off, balancing and control valves, dampers, filters and terminal boxes. Provide access doors (with a minimum width of 18 inches) in ductwork for servicing of all devices. Use only screwdriver operated access latching. Keyed locks on doors are not permitted, including doors at fire dampers. Access doors shall be clearly marked on drawings. To the greatest extent possible, design systems so required access points do not occur in spaces intended for high design impact.

C. All pneumatic controls, relays, end point switches, etc. shall have 1-1/2 inch gauges installed to read the output/input signals.

D. All steam line valves shall be gate valves.

E. All air compressor line valves shall be ball valves.

F. All pneumatic line valves shall be ball valves unless not appropriate for the application.

G. All valves less than 2-1/2 inch shall be ball valve type unless not appropriate for the application.

H. All gauges shall be liquid filled except on steam and condensate return lines.

I. Roof top equipment shall be dampened to eliminate perceptible vibrations.

J. Clearances, follow manufacturers recommendations, however, a minimum of 3 feet around areas requiring maintenance shall be provided for.

K. Assume a 20 year life cycle with 12% spare capacity for system component selection.

L. All Laboratory drain piping shall be acid resistant, regardless of the use of the laboratory.

M. All mechanical equipment shall be designed to be accessible for service without rigging or equipment.

1.2 IDENTIFICATION OF PIPING SYSTEMS

A. The Owner has instituted a common system to assist in the identification of the contents of piping systems. This system conforms to the current ANSI standard A13.1.

B. Positive identification of the contents of a piping system shall be by lettered legend giving the name of the contents in full or abbreviated form. In addition, arrows shall be used to indicate direction of flow of those contents.

C. Legends shall be brief, informative, pointed and simple for greatest effectiveness. Legends shall be applied close to valves or flanges and adjacent to changes in direction, branches and where pipes pass through walls and floors, also at intervals on straight pipe runs sufficient for identification usually not more than 25 feet.

D. Attention shall be given to visibility of the pipe markings. Where pipe lines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal center line of the pipe to facilitate a more direct line of sight.

E. Valve charts shall be posted in all Equipment Rooms. Tags shall identify each valve identifying what content they control and to what specific piece of equipment that content is supplied.

F. Piping Identification Legends with designated colors shall be as follows:

1. Piping with contents that are inherently hazardous:

    a. Flammable or explosive materials: Yellow field with Black letters.
    b. Chemically active or toxic materials: Yellow field with Black letters.
    c. Materials with extreme temperature or pressures: Yellow field with Black letters.

2. Piping with contents that are inherently low hazard:

    a. Liquid or liquid admixture: Green field with White letters.
    b. Gas or gaseous admixture: Blue field with White letters.

3. Piping with contents that are fire quenching materials:

    a. Water, foam, CO_2, etc.: Red field with White letters.

G. Size of Legend Letters

1. For pipes with Outside Diameters of 3/4 inch to 1-1/2 inch:

    a. Length of color 8 inches, height of letters 1/2 inch.

2. For pipes with Outside Diameters of 1-1/2 inch to 2-1/2 inch:

    a. Length of color 8 inches, height of letters 3/4 inch.

3. For pipes with Outside Diameter of 2-1/2 inch to 6 inch:

    a. Length of color 12 inches, height of letters 1-1/4 inch.

4. For pipes with Outside Diameter of 6 inch to 10 inch:

    a. Length of color 24 inches, height of letters 2-1/2 inch.

5. For pipes with Outside Diameter greater than 10 inches:

    a. Length of color 32 inches, height of letters 3-1/2 inch.

1.3 PREFERRED HVAC EQUIPMENT AND EQUIPMENT MANUFACTURERS

A. Air Compressors for building system, 1 hp or greater. No oil-less compressors shall be used except for compressors generating air for human consumption.

1. Quincy.
2. Ingersol Rand

B. Air Compressors less than1 hp, follow manufacturer's recommendations.

C. Air Dryer Systems:

1. Hankison.
2. Airco.

D. Back Flow Preventers:

1. Febco.
2. Wilkens Zurn
3. Watts.

E. Valves:

1. Apollo.
2. Hammond.
3. Watts.
4. Milwaukee.
5. Victaulic.

F. Heat Exchangers (Bundles):

1. Bell & Gossett.
2. Taco.

G. Air Compressor Inlet Air Filters:

1. Coalescent or Particulate Dryer type only.

H. Air Compressor Inline Filters:

1. Coalescent or Particulate Dryer type only.

I. Steam Pressure Regulators:

1. Spence (no exceptions).

J. Pumps (Domestic Hot Water pumps shall be brass or bronze):

1. Bell & Gossett.
2. Armstrong.
3. Peerless.
4. Taco.

K. Steam Traps:

1. Spirax/Sarco

L. Strainer:

1. Wye type with blow-down valve.

END OF SECTION

SECTION 23 50 00 - HVAC CHEMICAL CLEANING AND WATER TREATMENT

1.1 CHEMICAL CLEANING AND WATER TREATMENT - GENERAL

A. Contractor shall engage the services of the Water Treatment Contractor that currently services Case Western Reserve University to provide a complete fluid treatment service, designed to minimize corrosion and scale formation in the piping systems. Coordinate with Owner to determine current water treatment service provider.

B. All necessary cleaning chemicals, treatment chemicals, control equipment and services shall be provided by the Water Treatment Contractor. The specifications shall include a one (1) year Service Agreement for each system that shall cover the supply of chemical treatment and service. The fluid treatment supplier shall receive written notice from the Contractor prior to temporary or permanent start-up of any system requiring chemical treatment system. Makeup water piping shall conform to the Board of Health and all City, State, and Federal Code requirements.

C. The fluid treatment supplier shall forward within 90 days from job acceptance, the following for approval to the Owner:

1. System installation drawings and diagrams.
2. Product information sheets on each component, device, pump, controller, valve, etc., being supplied in the system.
3. Cleveland City Water supplies all systems.
4. Product information sheets and Material Safety Data Sheets on all chemical products being supplied for each system, including cleaning chemicals.
5. Recommended feed rates on each chemical product.
6. Recommended operating conditions for each system, including cycles of concentration, chemical test limits and limits of water treatment system set points.

1.2 CHEMICAL CLEANING

A. The new and any existing piping systems shall be thoroughly flushed out of cutting oils and other loose extraneous materials. This shall include piping installed now or capped for future use. The cleaning chemicals shall be added by the Contractor. The chemical supplier shall instruct the Contractor as to proper feed rates, shall check that the cleaning solution is actually in each system, shall instruct the Contractor as to when to flush the systems and shall check each system following flushing to insure all cleaning materials have been removed from each system. The Contractor shall block open all modulating valves, zone valves and all other system restrictions. If building pumps are not available, the Contractor shall provide portable pumps to circulate water for cleaning purposes.

B. Chemicals used for the cleaning of systems shall comply with the recommendations of the manufacturers of the major components in the system.

C. A certificate of cleaning shall be provided by the cleaning chemical supplier to the Owner, as well as a list and MSDS Sheets for all chemicals being used in the cleaning process.

D. The cleaning chemical supplier shall supervise the cleaning.

E. Provide chemical cleaning as each phase of the project is accepted. In addition, provide a complete full system cleaning at the completion of the final phase. The total system shall be cleaned before activation (primary and secondary).

1.3 HOT WATER AND GLYCOL SYSTEMS

A. The systems shall each have a 5-gallon capacity Shot Feeder installed. The system shall be thoroughly flushed and cleaned.

B. The feeders shall have:

1. Inlet opening (3/4" NPT).
2. Outlet opening (3/4" NPT).
3. Bottom drain with drain valve to be piped to a floor drain.
4. Mounting bracket.
5. Top opening for chemical addition (2" minimum).
6. Pressure test as required.
7. Install feeders in a two valve bypass arrangement around the most convenient circulating pump. 3/4" NPT feeder lead-in line shall be taken from the circulating line on the discharge side of the pump. 3/4" NPT feeder outlet line shall run to the circulating line on the suction side of the pump.

C. Antifreeze shall be non-toxic polypropylene only.

1.4 WATER TREATMENT COMPANY NOTIFICATION

A. Contractor shall notify the Water Treatment Company in writing prior to the operation of any Water System so that they can be initially charged with proper system chemicals.

1.5 CONSULTING ANALYSIS SERVICE

A. Provide installation, cleaning, start-up supervision, and training of Maintenance Personnel.

B. Provide written instructions, dosage rates, control limits, and a complete supply of test kits, reagents and test materials.

C. After Project is Substantially Complete, provide a minimum of 4 quarterly Consulting Analysis Service Visits with written reports and recommendations submitted. Provide a 1-year supply of all chemicals from date of initial start-up.

END OF SECTION

SECTION 23 73 00 - HVAC AIR HANDLING UNITS

1.1 AIR HANDLING UNITS GENERAL

A. All motors over 10 HP shall be variable frequency drives.

B. All chilled water coils shall have minimum of 1/2 inch ball valves on drains and vents.

C. All headers shall be brass or copper.

D. All motors shall be high efficiency with adjustable base. VFD driven motors shall also be inverter rated.

E. Duct sizing: All distribution feeding more than five terminals shall have 15% expansion capability.

F. All fan sizes shall provide for 15% free space for future expansion.

G. All mechanical duct shafts shall provide for 25% free space for future expansion.

H. Where possible, Owner preferred HVAC system for non-research/laboratory facilities is a VAV air handling system with a VFD on both the supply and return air fans and VAV terminal boxes with reheat coils as necessary on the respective zones. Continual renovation work of these facilities lends a VAV type system most adaptable to change.

I. Satellite equipment rooms, telecommunications rooms, electrical equipment rooms and other high heat gain environments shall only have cooling terminals, no reheat coils, and they shall operate independently of the building cooling system.

J. Owner acknowledges that it is not economical to provide thermostat control in each space, however, to accommodate the diversity of occupants found on campus system design should attempt to provide no more than three spaces controlled off of one thermostat in office areas.

K. In addition to code requirements, HVAC Systems shall be connected to emergency power if they serve SER Rooms.

L. Design professional shall assure, via field investigations, air balancing reports, reviews and interviews, that there is sufficient availability of required capacities of existing systems to satisfy the demands of the project specifications without affecting other areas serviced by the existing system and shall document and verify with Owner.

M. The passage of any piping through SER, electrical or telecommunications rooms, except for the Fire Suppression lines, is prohibited.

N. For duct cleaning purposes, provide access panels at every 50 feet of straight duct and both upstream and downstream of each elbow and reheat coil.

O. Spring isolation shall be provided on fans/blower assemblies

P. Service lights shall be provided in each compartment of the air handling units. Coordinate with Electrical Sections.

Q. All fan rotation directions shall be clearly marked.

R. Assume a 20 year life cycle with enough spare capacity to compensate for system degradation over those 20 years.

S. All air cooled condensers shall be set on curbs built into the roof. The bottom of the units shall be not less than 24 inches off the roof.

T. Provide access at all dampers, manual or automatic. Access shall be large enough to complete any foreseeable work. All equipment not on legs shall be on housekeeping pads.

U. All condensate pans shall be stainless steel. Drains shall be copper with an exterior cleanout, and with a "P" trap installed at Floor Drain.

V. All systems shall have pre-filters and final filters with magnahelic gauges.

W. Building Cooling Systems shall not be used to satisfy Process Cooling requirements.

X. Access doors to pressurized spaces shall open inward.

Y. Access doors to spaces in vacuum shall open outward.

1.2 ACCEPTABLE AIR HANDLER EQUIPMENT MANUFACTURERS

A. Air Handling Units:

1. Trane.
2. York.
3. Carrier.
4. McQuay.
5. Air Enterprise.

B. Computer/Server Rooms (and other heat generating rooms):

1. Liebert.

C. Chillers:

1. Trane.
2. Carrier.
3. York.

D. Steam Piping, Supply: Schedule 40, black seamless.

E. Steam Piping, Return: Schedule 80, black seamless.

F. Steam Traps:

1. Sarco.

END OF SECTION

SECTION 25 10 00 - BUILDING AUTOMATION SYSTEM

1.1 CURRENT EQUIPMENT

A. Currently the Campus has the following three building automation systems.

1. Invensis (Schneider Electric)
2. Johnson Metasys.
3. Trane Tracer Summit.

B. Coordinate with the Owner to determine which system is appropriate for each design.

C. All Hood Control Systems shall be compatible and integrate with the building's control system with full technical support from the vendor.

END OF SECTION