

## 5.23.05 - COMMON WORK RESULTS FOR HVAC DESIGN AND CONSTRUCTION STANDARD

---

### PART 1: GENERAL

#### 1.01 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 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 the University for approval.

#### 1.02 References:

- A. ASHRAE Handbook – HVAC Applications
- B. MSS SP-58 – Pipe Hangers and Supports – Materials, Design, and Manufacture
- C. MSS SP-69 – Pipe Hangers and Supports - Selection and Application.
- D. SMANCA Handbook – HVAC Duct Construction Standards

#### 1.03 Requirements:

##### A. Metering:

1. Building utilities are required to be metered including but not limited to: Chilled water, steam, condensate, and electricity. Building BTU metering shall also be provided through the BAS by utilizing chilled water flow and temperature sensors on chilled water supply and return piping. Locate hydronic metering equipment inside a machine room. Provide isolation valves to accommodate meter service
2. For buildings with mixed occupancy (E&G and non-E&G), provide sub-metering to property allocate utility costs between organizations. Coordinate sub-metering requirements with the University.
3. Refer to section 5.23.09 for further utility metering requirements.

##### B. Valves:

1. Provide valves with extended stems to be accessible on outside of insulation. Valve body and stem shall be insulated.
2. Provide means of access where valves are not exposed.
3. Provide valve vaults or boxes, as conditions demand, to provide access to valves installed below grade.

## 5.23.05 - COMMON WORK RESULTS FOR HVAC

### DESIGN AND CONSTRUCTION STANDARD

---

4. Hydronic equipment connections shall be provided with shutoff valves on supply and return piping.
- C. Hangers and Supports:
1. Design piping systems to utilize pipe hangers, inserts, and supports in conformance with International Mechanical Code, MSS SP-58 and MSS SP-69.
  2. Provide hangers fabricated to allow adequate vertical adjustment of 1.5 inches minimum after installation while still supporting the load. The use of pipe hooks, chains, or perforated iron piping for support is prohibited.
  3. Provide pipe hangers within 12 inches of each change in direction and provide hangers on both sides of line valves.
  4. Provide vertical piping support at each floor. For pipe risers exceeding three floors, evaluate pipe supports for longitudinal expansion and support requirements. Support riser piping independently of connected horizontal piping.
  5. Provide supports for ductwork and accessories in accordance with SMACNA requirements.
  6. Provide four inch high concrete housekeeping pads and equipment bases for the following: outdoor equipment on grade, indoor floor mounted equipment in mechanical rooms and penthouse equipment rooms. Housekeeping pads shall extend a minimum 6 inches beyond the equipment or supported member in all directions. Provide pads with half-inch chamfer on all exposed edges, placed and finished smooth and level to ensure proper and continuous support for the bearing surfaces of equipment.
  7. Provide prefabricated, factory insulated curbs for roof-mounted equipment, a minimum of 12 inches in height above finished roof surface. Provide curb pitches to match roof slope where required.
  8. Provide sleeves for all ductwork and pipe penetrations through walls, roofs, or floors. Provide sleeves larger than pipe or ductwork to accommodate insulation thickness. Provide sleeves in non-load bearing surfaces fabricated of galvanized sheet metal and sleeves in load bearing surfaces constructed of uncoated carbon steel pipe. Sleeves shall not be installed in structural members unless specifically approved by the University. Caulk all sleeves water and airtight. Provide UL listed sealant between pipe and sleeve as required by code. Provide escutcheon around penetrations in finished areas.
  9. Provide Linkseal (or approved equal) assembly for pipe penetrations through waterproofed floors and walls.
  10. Where piping or ductwork penetrates a floor, ceiling or wall, provide fire stopping insulation, sealed airtight, to close off penetration space between

## 5.23.05 - COMMON WORK RESULTS FOR HVAC DESIGN AND CONSTRUCTION STANDARD

---

pipe, ductwork, and adjacent work. Provide escutcheon covers at both sides of penetration.

11. Where piping or ductwork penetrates a fire rated floor, wall, or ceiling, provide fire-safe insulation so that the assembly, when complete, is UL listed and equals the fire rating of constructed penetrated.
12. Provide concrete-filled, spring-isolated inertia bases installed on top of concrete housekeeping pad for rotating mechanical equipment, including but not limited to fans and pumps.
13. Fans greater than 5,000 shall be rigidly mounted to floor with no vibration isolators. The fan shall be dynamically balanced and tested at the factory such that displacement does not exceed 1.5 mils peak to peak in any direction. Typical spring isolators may be specified with University approval.

### D. Vibration and Sound Control:

1. Design mechanical equipment, piping, and ductwork to be installed with vibration isolation devices, as required, to minimize transmission of noise and vibration transmitted to the building structure or adjacent spaces in accordance with the latest version of ASHRAE Handbook – HVAC Applications.
2. Provide flexible connectors between ductwork and connections to air handling equipment. External isolation supports not required for fan-coil units with internally isolated fans.
3. Provide flexible connectors for piping connections to rotating equipment. For pipe systems 2 inches and smaller, provide braided stainless steel flexible connectors. For pipe systems 2 inches and larger, provide Kevlar reinforced rubber, double-sphere flanged flexible connectors.
4. Design equipment, supports, and connections such that maximum interior room background sound levels to not exceed the levels set forth in ASHRAE Handbook – HVAC Applications. Coordinate wall and slab construction requirements with Design Professionals to ensure conformance.
5. Pump bases shall include support for suction and/or discharge piping elbows.

### E. Mechanical Identification:

1. Hydronic Piping: Mark all piping with plastic pipe markers. Color and letter coding Standard is ANSI A13.1, “Scheme for Identification of Piping Systems”.

### F. Testing, Adjusting, and Balancing:

1. Testing, adjusting, and balancing (TAB) services for HVAC, piping, ductwork, and plumbing systems shall be provided in accordance with

**5.23.05 - COMMON WORK RESULTS FOR HVAC  
DESIGN AND CONSTRUCTION STANDARD**

---

Associated Air Balance Council (AABC) Standards. TAB work shall be done by a University approved, independent contractor.

**PART 2: PRODUCTS**

2.01 Motors:

- A. Refer to Section 5.26.60 for motor standard.

2.02 Valves:

- A. Section Valves 2" and smaller shall be gate or ball type, 2-1/2" and larger shall be gate or butterfly type.
- B. Shutoff Valves 2" and smaller shall be gate or ball valves, 2-1/2" and larger shall be gate or butterfly valves.
- C. Drain Valves 2" and smaller shall be gate or ball valves, 2-1/2" and larger shall be gate valves.
- D. Check Valves shall be spring-loaded silent type.
- E. Ball valves shall be full-port, 3-piece, with stainless steel trim.

**PART 3: EXECUTION**

END OF STANDARD