

**DIVISION 15 - MECHANICAL**

**Section 15050 - Basic Mechanical Materials and Methods**

**Introduction**

Mechanical systems materials and methods of installation common to some or all mechanical systems sections in Division 15.

**Part 1 – General**

- All electrical work associated with Division 15 shall comply with requirements of Division 16.
- Refer to section 15990 For testing requirements.
- All air delivery equipment requiring filtration shall be provided with MERV 13 or higher filters.

**Part 2 – Products**

**Non-Automated Hydronic Valves**

- See Appendix 15970 – Control Systems for discussions on automated valves.
- See Section 15300 for Fire Suppression system valve requirements.
- See Section 15520 – Steam Piping and Accessories for steam and steam condensate valves.
- Allowable Valve Types: Butterfly, Globe, or Ball. No Gate Valves shall be used.
- Sizes 6" and above shall have gear operator ball chain if located more than 7 ft. above floor in open ceiling utility and other not regularly occupied space.
- Ball valves should be used with pipe sizes of 2" and below. Butterfly valves should be used for all pipe sizes greater than 2".
  - Isolation Ball valves shall be 2- or 3-piece, 100% full-port, full-line size, bronze or stainless-steel body, stainless steel ball, and trim with threaded connections at all equipment and on all main branch take-offs.
  - Butterfly valves shall be 100% bubble-tight shut-off, lug type only, iron body with stainless steel disk. Valves have a minimum two-year warranty. Preferred manufacturers are Bray, Centerline, or UA approved equal.
- Provide brass valve tags marked for the service. See pertinent service specification for valve type.
- Soldered valve and piping appurtenances will not be allowed.

**Piping Labels**

- Provide at directional changes and/or each 20 ft.
- For applications not exposed to UV, labels to be pre-manufactured snap-on plastic wrap- around sized to cover entire circumference of piping and insulation or self-adhesive type.
- Where exposed to UV, provide labels and fasteners that are metal or other material not susceptible to UV damage. The University shall approve proposed product.
- Other label types such as stencils may be utilized if approved in writing by UFS Project Manager and UFS Mechanical Engineer.
- Lettering shall be sized to be easily legible and no less than ANSI Standard A13.1 requirements. Directional arrows shall indicate direction of flow and shall be located to point away from lettering.
- Provide the following labels with the following color identification. Where utilities are not specified, comply with ANSI Standard A13.1.

Utility	Abbreviation	Color Identifications
<b>HVAC Cooling Systems</b>		
Condenser Water Supply	CWS	White on green
Condenser Water Return	CWR	White on green or light green

Chilled Water Supply	CHWS	White on blue
Chilled Water Return	CHWR	White on blue or light blue
Process Cooling Water Supply	PCWS	White on blue
Process Cooling Water Return	PCWR	White on blue or light blue
Chilled Beam Water Supply	CBWS	White on blue
Chilled Beam Water Return	CBWR	White on blue or light blue
Cooling Coil Condensate	Coil Cond	White on green
<b>HVAC Heating Systems</b>		
Heating Hot Water Supply	HHWS	White on red
Heating Hot Water Return	HHWR	White on red or light red
High Pressure Steam include service ( <i>pressure</i> )	HPS ( <i>pressure</i> ) PSIG	Black on yellow
Medium Pressure Steam include service ( <i>pressure</i> )	MPS ( <i>pressure</i> ) PSIG	Black on yellow
Low Pressure Steam include service ( <i>pressure</i> )	LPS ( <i>pressure</i> ) PSIG	Black on yellow
Gravity Steam Condensate	Grav S Cond	Black on yellow
Pumped Steam Condensate	Pmp S Cond	Black on yellow
Natural Gas	Nat Gas	Black on yellow
<b>Plumbing Systems</b>		
Domestic Cold Water	DCW	White on green
Domestic Hot Water	DHW	White on red
Domestic Hot Water Return	DHWR	White on red or light red

#### Escutcheons

- Install in exposed locations, except in mechanical rooms.
- Escutcheons to be hinged, chrome-plated type.

#### Pipe Sleeves / Concrete Walls & Floors Above Grade

- Shall be schedule 40 steel.
- Sized for full dimensions of insulation and fire caulk where required.
- Install in all exterior walls, firewalls, and floors.
- Sleeves are not required in cored concrete except wet area floors.
- Floor sleeves to extend 1" above floor surface in wet areas.

Pipe sleeves in non-rated, non-masonry walls or partitions. Provide 24 gage galvanized steel.

Pipe sleeves in rated non-masonry wall or partitions – provide listed approved fire-rated assemblies.

Pipe sleeves installed below ground through exterior walls shall have mechanical type neoprene seals.

#### Pipe Hangers

- Use Vibra-Zorb cushioned supports on 1 ¼" pipe and smaller which is connected to vibrating equipment.
- Provide piping support hangers to ensure that no sags occur. Minimum hanger rod sizing and maximum hanger spacing shall conform to following table and the International Mechanical Code, whichever is more stringent:

<u>Material</u>	<u>Pipe Size</u>	<u>Spacing</u>	<u>Hanger Rod</u>
Steel Pipe	½"	6'-0"	3/8"
	¾" through 1-¼"	8'-0"	3/8"

	1-½, 2"	10'-0"	3/8"
	2-½"	10'-0"	3/8"
	3"	12'-0"	3/8"
	4"	12'-0"	3/8"
	5"	12'-0"	1/2"
	6"	12'-0"	1/2"
	8-12"	12'-0"	5/8"
Copper Pipe	½"	6'-0"	3/8"
	¾", 1"	8'-0"	3/8"
	1-¼ through 4"	10'-0"	3/8"
	5" - 6"	12'-0"	1/2"
	8" and above	12'-0"	5/8"
Cast Iron	1 ½ " - 2"	1 ea. Joint	3/8"
	3"	1 ea. Joint	1/2"
	4" through 6"	1 ea. Joint	1/2"
	8" and above	1 ea. Joint	5/8"
Vertical risers shall be supported at each floor line with steel riser clamps			

#### Equipment Nameplates.

- Provide nameplates for all pieces of equipment.
- Nameplate shall be minimum of 3/32" thick laminated phenolic plastic.

#### Access Doors

- Minimum size 16"x16" for wall access - provide 24" x 24" for ceiling access.

#### Motors

- Motors shall have premium efficiency EPAC rating in accordance with IEEE Standard 112 test method B.
- Motors shall have a minimum service factor of 1.15 and the design load shall not exceed 1.0.
- Motors located in conditioned space shall have an ambient rating of 104° F (40°C). Motors in unconditioned space shall have an ambient rating of 122°F (50°C).

### Part 3 – Execution

#### Workmanship

- Piping to run parallel to building lines.
- Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- Particular attention must be paid to the proximity of mechanical piping and equipment to electrical conduit and cable.
- All underground utility pipe shall have a tracing wire that is electrically continuous. The wire shall be 14TW AWG stranded (green) wrapped around or buried alongside the pipe. The wire shall be terminated at either end in a box flush with the ground with 3 feet of coiled wire in the box.
- Pitch piping in direction of flow 1" per 40 ft.
- Piping to be inspected and pressure tested prior to insulation.
- Piping to be routed to allow access to equipment.
- Welding to be done by welders certified locally in the State of Arizona. Welders must have proof of certification in their possession.
- Weld inspection
  - Visual inspection on low pressure piping (CHW, Condensate, LPS, HW, etc.).
  - Visual inspection and optional radiography on medium and high-pressure steam piping (MPS, HPS).
- Do not support pipe with sleeve.
- Pipes on trapeze type hangers shall be firmly secured.

#### Installation

- Install strainers with full port ball valve on blowdown. Provide hose threaded connection on valves 3/4" and below.
- All gauges to be installed with a single gauge manifolded with ball valves on both sides of pumps, heat exchangers, tunnel supply and return, etc.
- Install valves with stems in vertical position except ball valves. Do not go below horizontal with ball valve stems.
- Use 10 mil plastic wrap around copper pipe on ferrous hangers or supports.
- Use dielectric fittings whenever joining dissimilar metals.
- Install unions on either side of threaded valves to facilitate removal and replacement.

#### Equipment Installation/Removal

- Provide access to all equipment in accordance with the Mechanical code and Manufacturer's recommendations, for maintenance, servicing. And removal.
- Valve installation must allow sufficient access for service and replacement.
- Domestic Water Piping Arrangement
  - Provide recirculating loops for all domestic hot water piping systems with pipe runs longer than 50 feet.
  - Arrange piping in such a manner that there are no "transitory dead legs", i.e., piping branch lines that contain stagnant water. See Section 15000 for further discussions.
  - Refer to "Provisions for Future Expansion and/or Installations" Section 15000 - General Discussion for the installation requirements of future connections.
- Electrical conduits shall not touch or be supported via pipes or ducts.
- Ensure fire and smoke separation rating of walls and floors is maintained via appropriate protection of openings and penetrations.

#### **End of Section 15050**