



## DESIGN REQUIREMENTS

### VALVES FOR PLUMBING

#### GENERAL INFORMATION

- 1.1 This section applies to valves for domestic hot and cold water, natural gas and compressed air.

#### DESIGN REQUIREMENTS

- 2.1 Design Criteria
  - a. The Consultant is to confirm the application, including temperature and pressure requirements, of the specified valves to insure suitability of use in the specified systems.
  - b. The design drawings shall include a riser and flow diagram and details of system specialties for all Plumbing systems. Collectively, the drawing elements should capture and illustrate all valve applications including: shut-off, balancing, bypass, control and direction flow control. Exception: drain valves can be noted on drawings.
- 2.2 Valve flange rating shall be compliant with system working pressure, per ANSI pressure classification tables.
- 2.3 The design documents shall clearly identify the appropriate valve for each service and application and shall identify applicable materials and pressure/temperature rating.
- 2.4 Minimum test pressure for all valves to be 1.5 times maximum system working pressure unless noted otherwise.
- 2.5 Within each building there shall be a building valve to isolate the service to the building.
- 2.6 Isolation valves shall be provided at all pumps, tanks, reducing and automatic or mechanical flow control devices, radiation, coils and heat exchangers, and at all other apparatus requiring partial drainage of the system for periodic maintenance or inspection. The isolation valves shall be so located as to permit removal and/or service of the isolated equipment without draining complete or substantial portions of the system. Except where flanged valves are used, each connection to equipment shall be made with screwed or flanged union on the equipment side of the valve.
- 2.7 Isolation valves shall be provided at all branch takeoffs from system mains and risers and returns to system.

## DESIGN REQUIREMENTS

- 2.8 Drain valves shall be provided on tanks, receivers, risers and where they may be required or necessary, or directed for draining the lines and equipment. Drain valves or plug cocks shall be provided at the low points for proper drainage and, where required or directed, cocks and valves shall be provided with threaded ends for hose connections.
- 2.9 Check valves installed in the horizontal position shall be swing checks; valves installed in the vertical position shall be silent checks, except that all check valves in pump discharges shall be silent checks.
- 2.10 Provide blow-off valves at all strainers.
- 2.11 All risers shall have drain valves installed at the low point to permit draining of supply and return risers without impacting other system risers. Drain valves shall have hose bibs and caps.
- 2.12 Specifications shall include requirement for valve tags and associated chart/riser diagram.
- 2.13 Valve Application Types for Plumbing Systems
  - a. Valves 3" size and smaller used for water shut-off shall be ball valve type.
  - b. Valves 4" size and larger used for water shut-off shall be gate or high performance butterfly type. Only lug type butterfly valves shall be specified.
  - c. Valves 3" size and smaller used for hydronic bypass or for flow control shall be ball valve type. Valves 4" and larger shall be lubricated plug valve.
  - d. Valves 4" size and larger used for controlling water flow at pumps and at equipment, and for bypass control shall be lubricated plug type.
  - e. Valves 4" and larger for natural gas services shall be lubricated plug valves.
  - f. Valves 4" and larger for compressed air services shall be gate valves. Valves 3" and smaller shall be ball valve type.

## CONSTRUCTION REQUIREMENTS

- 3.1 Valve Quality Assurance
  - a. Valves and valve construction to be suitable for the pressure, temperature, and fluid quality of the service in which they are to be used.

## DESIGN REQUIREMENTS

- b. Each valve shall have the maker's name or brand, the figure or list number and the guaranteed working pressure cast on the body and cast or stamped on the bonnet, or shall be provided with other means of easy identification.
- c. Minimum test pressure for all valves to be 1.5 times maximum system working pressure unless noted otherwise. After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.
- d. All valves, including gate valves, check valves, pressure reducers, backflow preventers, butterfly valves, etc., shall be designed for a minimum working pressure of 125 psig to 150 psig range unless otherwise noted.

### 3.2 Valve Types

- a. Gate Valves
  - 1. Use rising stem gate valves where space permits.
  - 2. Valves six inches (6") and larger should be equipped with a valve by-pass.
- b. Globe Valves
  - 1. When globe valves are used for balancing, throttling nuts must be specified.
- c. Silent Check Valves
  - 1. Silent check valves for domestic water and non-potable water system pump discharges should be flanged globe type.
  - 2. Silent check valves for fire standpipe pump discharges should be flanged wafer type.
- d. Plug Lubricated Valves
  - 1. Valves should be wrench operated.
  - 2. Provide valve locking devices where required, and memory lock where available.
  - 3. For valves installed below ground, provide an extension pipe, wrench socket, socket, operating head, sealant pipe, sealant injector assembly tee handle socket wrench and all other hardware installed in a three piece adjustable screwed cast iron valve box.
- e. Ball Valves
  - 1. Ball valves used for balancing should be specified with memory balancing stops.

## DESIGN REQUIREMENTS

2. The specifications should require that ball valves with mounting pad should be provided where valve actuators are installed.
  3. When space limitations exist, a "T" handle in lieu of lever handle may be provided to actuate valves 2 inches and smaller.
- f. High Performance Butterfly Valves
1. Lug type valves.
  2. Carbon steel construction.
- 3.3 Backflow Preventers
- a. Provide backflow preventers for all serrated tip water outlets, hose end connections, water supply piping interconnections with equipment other than domestic water systems equipment.
  - b. Install back flow preventer in horizontal position at floor level for easy access, field testing and maintenance except where required to be installed above the level of the equipment it serves.
  - c. Provide atmospheric vacuum breakers on the discharge side of subject to back pressure and subject to back-siphoning.
  - d. Provide vandal proof hose end connections with brass, atmospheric venting vacuum breakers.
  - e. Provide double check valve assembly for fire standpipe and sprinkler water service to a system siamese and all direct and indirect water connections through which foreign matter might enter the potable water system, thus constituting a nuisance but not constitute a health hazard.
  - f. Provide a reduced pressure back flow preventer assembly for fire standpipe and sprinkler water service to a system siamese and all direct and indirect water connections where the potable domestic water system may be subject to backpressures from toxic chemicals, sewage, or other lethal substances.
- 3.4 Valve Identification:
- a. Each valve in each piping system shall be tagged with a brass or aluminum tag numbered consecutively for each system and attached to the valve with a brass or aluminum chain.
  - b. Valve tags shall have stamped abbreviations of the system in addition to the valve number.



## DESIGN REQUIREMENTS

- c. The contractor should be asked to prepare a valve schedule listing each valve, system, location and purpose.

## REFERENCE

- 4.1 The applicable CSI Specification Section is 22 05 23.