

## SCOPE

- I 1.1 This practice covers the design and inspection of all types of valves used for control, both throttling and on-off services. Gate valves are specifically excluded.
- I 1.2 **Diaphragm and piston actuators, positioners and ancillaries** for control valves are covered by this practice. Motor actuators are covered by [IP 15-9-2](#).
- I 1.3 **An asterisk (\*)** indicates that a decision by the Owner's Engineer or Purchaser is required, that additional information is to be furnished by the Owner's Engineer, or that information for Owner's Engineer approval is to be supplied by the vendor or Purchaser.

## SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the practices, standards and specification which shall be used with this practice.
- I \* 2.2 **Table 2** lists the practices, code and standards which shall be used with this practice, as specified by the Purchaser.

TABLE 1

| PRACTICES                   |                                                                        |                                    |                                                                   |
|-----------------------------|------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------|
| <a href="#">IP 3-12-9</a>   | Additional Requirements for Valves                                     | <a href="#">IP 14-3-1</a>          | Fireproofing                                                      |
| <a href="#">IP 3-16-1</a>   | Flanged Joints, Gaskets, and Bolting                                   | <a href="#">IP 20-1-1</a>          | Inspection of Equipment and Materials                             |
| STANDARDS AND SPECIFICATION |                                                                        |                                    |                                                                   |
| <b>ASME Standards</b>       |                                                                        | <b>ANSI / ISA Standards (Cont)</b> |                                                                   |
| B16.11                      | Forged Fittings, Socket-Welding and Threaded                           | S75.04                             | Face-to-Face Dimensions for Flangeless Control Valves             |
| B16.34                      | Valves - Flanged, Threaded, and Welding End                            | S75.17                             | Control Valve Aerodynamic Noise Prediction                        |
| <b>ANSI / ISA Standards</b> |                                                                        | <b>MSS Specification</b>           |                                                                   |
| FCI 70-2                    | Control Valve Seat Leakage                                             | SP 25                              | Standard Marking Systems for Valves, Fittings, Flanges and Unions |
| S75.01                      | Flow Equations for Sizing Control Valves                               |                                    |                                                                   |
| S75.03                      | Face-to-Face Dimensions for Flanged Globe - Style Control Valve Bodies |                                    |                                                                   |

TABLE 2

| PRACTICES                 |                                                                           |                            |                                                                                |
|---------------------------|---------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------|
| <a href="#">IP 2-1-1</a>  | Plant Noise Design Criteria                                               | <a href="#">IP 18-3-4</a>  | Casting Quality for Alloy Valves in Hydrogen Service and High Pressure Service |
| <a href="#">IP 3-12-1</a> | Valve Selection                                                           | <a href="#">IP 18-10-1</a> | Additional Requirements for Materials                                          |
| <a href="#">IP 15-7-2</a> | Protective Systems                                                        | <a href="#">IP 18-12-1</a> | Positive Material Identification                                               |
| <a href="#">IP 15-9-2</a> | Electric Motor Operators for Valves                                       | <a href="#">IP 19-1-1</a>  | Paint and Protective Coatings                                                  |
| CODE AND STANDARDS        |                                                                           |                            |                                                                                |
| <b>ASTM Standards</b>     |                                                                           | <b>ASME Code</b>           |                                                                                |
| A 269                     | Seamless and Welded Austenitic Stainless Steel Tubing for General Service | B31.3                      | Process Piping                                                                 |
| A 320                     | Alloy Steel Bolting Materials for Low Temperature Service                 | <b>IEC Standard</b>        |                                                                                |
| B 16                      | Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines          | 534-2                      | Industrial-Process Control Valves, Part 2, Flow Capacity, Section One and Two  |
| B 68                      | Seamless Copper Tube, Bright Annealed                                     |                            |                                                                                |

- I \* 2.3 **Valve ancillaries** such as limit switches, positioners and relays, shall be furnished mounted on the control valve, unless specified otherwise.
- S,I 2.4 **Valves used in protective systems** shall be in accordance with [IP 15-7-2](#).

|                  |            |                       |                                                                                    |
|------------------|------------|-----------------------|------------------------------------------------------------------------------------|
| <b>IP 15-9-1</b> |            | <b>Control Valves</b> |  |
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| Rev. 1           | March 1998 |                       |                                                                                    |

(This practice is appropriate for attachment to Inquiry or Purchase Document)

## MATERIALS

- S,R 3.1 Body Class and materials shall meet or exceed the line piping classification and materials requirements.
- R 3.2 **Trim materials** shall be per the manufacturer's standard for the specified service conditions, except as modified below:
- Exposure to wet H<sub>2</sub>S service. Trim material shall be limited to stainless steel types S30400 (304) or S31600 (316) and Hardfacing Alloy 6.
  - Trim of hardened stainless steel construction (S44004 (440C) or S17400 (17-4PH)) are required for the following severe services:
    - Steam pressure reduction where the pressure drop may exceed 100 psi (700 kPa).
    - Condensate from boiler where the pressure drop may exceed 100 psi (700 kPa).
    - Where more than 3% of the inlet fluid by weight may vaporize in the valve together with a pressure drop exceeding 150 psi (1000 kPa).
    - Any pressure reduction greater than 250 psi (1700 kPa).
  - For other severe services such as catalyst slurry service and all others that are not listed above, the trim material shall be approved by the Owner's Engineer.
- R 3.3 **Austenitic stainless steel, Monel and nickel alloy valves** shall have trim, bolting, and stem of the same nominal chemistry as the body except when Alloy 6 trim has been specified. Where Alloy 6 is specified, all surfaces shall be covered with a minimum thickness of 0.05 inches (1.3 mm) and a maximum of 0.08 inches (2 mm) of Alloy 6. If undercutting of Alloy 6 covered surfaces is anticipated, then centrifugally cast solid Alloy 6 shall be used instead of overlay methods.
- S 3.4 PTFE packing shall not be used for design temperatures above 450°F (230°C). Alternative **packing material** such as graphite may be used. Asbestos packing is prohibited.
- S \*3.5 Process-wetted **gaskets** shall be suitable for the line service classification.
- R ♦ 3.6 **Tubing downstream of instrument air filters** shall be stainless steel with stainless steel compression fittings. Brass fittings shall be PVC-coated after completion of pneumatic leak testing.

## VALVE DESIGN

### GENERAL

- I ♦ \*4.1 The selection of valve types and sizes, body and trim materials shall be approved by the Owner's Engineer.
- R ♦ \*4.2 The **pressure-temperature rating**, dimensions, tolerances, materials, non-destructive examination requirements, testing and marking for cast, forged, fabricated steel flanged, threaded, and butt welding end valves shall be per ANSI B16.34. Additional requirements for specific valves are listed below.
- Flanged-end and flangeless valves shall have a minimum Class 300 rating.
  - Threaded end valves shall have a minimum Class 600 rating.
  - Butterfly valves shall match the line service classification rating.
- S ♦ \*4.3 The use of **flangeless control valves** shall be restricted as follows:
- Flangeless valves shall not be** used where the **design temperature is above 600°F (315°C)**.
  - Flangeless valves shall not be** used where the **design temperature is below 600°F (315°C) and the service conditions meet the "dangerous" criteria defined below**:
    - Toxic materials** such as phenol, hydrogen sulfide, chlorine.
    - Highly corrosive** materials such as acids, caustic and similar materials.
    - Flammable materials** (including light hydrocarbons lighter than 68 degrees API).
    - Boiler feedwater and steam**, in systems requiring ANSI Class 300 and higher flange ratings.
    - Oxygen** in concentrations greater than 35%.
  - For **design temperatures above 400°F (205°C)**, body material shall have the same nominal coefficient of thermal expansion as the bolting material and adjacent flanges.
  - Flangeless valves in **flammable or toxic service** with exposed bolting greater than 3 in. (75 mm) shall not be used in **fire hazardous areas** as defined in [IP 14-3-1](#).
  - Flangeless valves shall be furnished with **centering lugs where space between the body and pipe flange permits**.