



# Materials System Specification

04-SAMSS-002

11 October 2010

Globe Valves

Document Responsibility: Valves Standards Committee

## Saudi Aramco DeskTop Standards

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Previous Issue: 21 December 2008    Next Planned Update: 11 October 2015

Revised paragraphs are indicated in the right margin

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## 1 Scope

This specification, along with the purchase order, defines the minimum requirements for steel, bolted bonnet, pressure seal bonnet, flanged and butt-welding end globe, angle globe, "Y" pattern globe and globe stop check valves, of outside screw and yoke (OS&Y) construction, in nominal pipe sizes (NPS) 1 and larger in Classes 150 through 2500.

Valves covered by this specification shall be suitable for wet, sour liquid or gaseous hydrocarbon services with design temperatures between -18 and 400°C.

Additional requirements for special services are covered in the following appendices:

<i>Appendix A</i>	<i>Pressure Seal Globe Valve</i>
<i>Appendix B</i>	<i>Low Temperature Services from -45 to -18°C</i>
<i>Appendix C</i>	<i>Cryogenic Temperature Service from -120 to -46°C</i>
<i>Appendix D</i>	<i>Steam Service</i>

## 2 Conflicts and Deviations

- 2.1 Any conflicts between this specification and other applicable Saudi Aramco Materials System Specifications (SAMSSs), Engineering Standards (SAESs), Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Valves Standards Committee Chairman (VSCC), Consulting Services Department of Saudi Aramco, Dhahran.
- 2.2 Direct all requests to deviate from this specification in writing to the Company or Buyer Representative, who shall follow internal company procedure SAEP-302 and forward such requests to the (VSCC), Consulting Services Department of Saudi Aramco, Dhahran.

## 3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this specification shall comply with the latest edition of the references listed below, unless otherwise noted.

### 3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

SAEP-302

*Instructions for Obtaining a Waiver of a  
Mandatory Saudi Aramco Engineering  
Requirement*

### Saudi Aramco Materials System Specifications

04-SAMSS-003      *Additional Requirements for Low Temperature Valves*

04-SAMSS-035      *General Requirements for Valves*

04-SAMSS-048      *Valve Inspection and Testing Requirements*

### Saudi Aramco Form and Data Sheet

6233-1-ENG      *Valve Data Sheet*

## 3.2 Industry Codes and Standards

### American Society of Mechanical Engineers

ASME B16.10      *Face-to-Face and End-to-End Dimensions of Valves*

ASME B16.34      *Valves - Flanged, Threaded, and Welding End*

### American Society for Testing and Materials

ASTM A105      *Standard Specification for Carbon Steel Forgings for Piping Applications*

ASTM A194      *Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both*

ASTM A216      *Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service*

ASTM A307      *Standard Specification for Carbon Steel Externally Threaded Standard Fasteners*

ASTM A320      *Standard Specification for Alloy Steel Bolting Materials for Low -Temperature Service*

### American Petroleum Institute

API STD 600      *Bolted Bonnet Steel Gate Valves - for Petroleum and Natural Gas Industries*

### British Standard Institution

BS 1873      *Steel Globe and Globe Stop and Check Valves*

BS 6364      *Valves for Cryogenic Service*

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National Association of Corrosion Engineers/International Organization for Standardization

*NACE MR0175/ISO 15156 Petroleum and Natural Gas Industries –  
Materials for use in H<sub>2</sub>S-containing  
Environments in Oil and Gas Production*

#### **4 Notes to Purchaser**

In addition to the valve requirements specified in this SAMSS or approved modifications, the following information, at minimum, shall be considered and included in purchase requisitions/orders as applicable:

1. Valve size
2. Pressure class
3. Ends (flanged w/raised face or ring joint, or welding ends)
4. Face-to-face dimensions, if non-standard
5. Operation requirements (gear or power operator)

*Commentary Note:*

*Manufacturer should be advised to provide a stem of sufficient length if it is anticipated that the valve may be retrofitted with an electrical actuator.*

6. Above ground or buried service
7. Seating, if other than metal seating (see appendices)
8. Disc type, if other than standard ball/plug type is required
9. Low temperature or cryogenic services (see appendices)
10. Orientation of installed valve, if other than stem-vertical
11. Special internal or external coatings
12. Other than standard wet sour hydrocarbon services (see appendices)
13. Other than standard materials (Refer to Saudi Aramco Engineering Standards for other permitted materials)
14. For pressure seal valves, style A or B shall be specified (see Appendix A)
15. Valves shall meet the applicable requirements of 04-SAMSS-035

*Commentary Note:*

*Form 6233-1-ENG, Valve Data Sheet, (refer to 04-SAMSS-035), shall be filled out by the Purchaser when ordering non-stock valves.*

## 5 General

Except as modified herein, all valves covered by this specification shall be in accordance with the applicable portions of API STD 600, respecting the fact that it was intended for gate rather than globe valves. Other design criteria shall be per British Standard BS 1873 except as modified herein.

## 6 Design

### 6.1 Body and Bonnet

- 6.1.1 The minimum wall thickness of body and bonnet shall be in accordance with API STD 600 or BS 1873.
- 6.1.2 Bolted bonnets shall be provided. Pressure seal bonnets are acceptable if specified by the Purchaser (see Appendix A).
- 6.1.3 Unless otherwise specified in the purchase order, a straight pattern body shall be supplied.
- 6.1.4 The body end ports shall be circular and shall not be less than as specified in ASME B16.34 for the inside diameter of a flanged fitting.
- 6.1.5 The face-to-face dimensions for flanged end (raised face or ring joint) valves and end-to-end dimensions for butt-weld end valves shall conform to ASME B16.10.
- 6.1.6 Refer to 04-SAMSS-035 for flanged and welding end connection requirements.
- 6.1.7 If a Separate bonnet backseat bushing is provided, it shall be tackwelded to the bonnet to prevent loosening or unscrewing.

### 6.2 Seating

Threaded seat rings shall be secured in place to prevent loosening in service. This may be done by tack welding.

### 6.3 Stuffing Box, Packing, and Lantern

These shall be in accordance with API STD 600.

### 6.4 Yoke Sleeve and Stem Nut

For gear operation, the stem nut shall be in accordance with API STD 600. Ball bearings (between yoke and yoke sleeve thrust carrying surfaces) shall be

furnished for all gearbox operated valves.

## 6.5 Disc

6.5.1 Disc shall be of ball/plug type. Discs with flat seating surface are prohibited.

6.5.2 Disc shall be guided.

## 7 Materials

7.1 The trim shall consist of the following:

- a) stem
- b) disc seating surface
- c) seat seating surface
- d) back seat bushing
- e) disc lock nut
- f) other small parts in contact with the line fluid

7.2 All parts, welds and heat affected zones of welds exposed to line fluids shall meet the hardness requirements and heat treatment requirements as specified in NACE MR0175/ISO 15156. This also includes materials under overlays, platings or coatings.

7.3 Body and bonnet shall be steel in accordance with ASTM A216 Grade WCB or WCC or ASTM A105.

7.4 Seats shall be carbon steel ASTM A105 with a hardfaced weld deposit, Stellite 6 or equal, on the seat seating surface with a minimum finished deposit thickness of 1.5 mm.

7.5 Disc shall either be carbon steel to ASTM A105 with a stainless steel AISI Type 410 weld deposit on the seating surface with a minimum finished deposit thickness of 1.5 mm or solid stainless steel AISI Type 410.

7.6 The stem shall be stainless steel AISI Type 410 or 17-4 PH.

7.7 Disc lock nut, disc thrust plate, backseat bushing, and lantern ring shall be stainless steel AISI Type 410.

7.8 The substitution of stainless steel AISI Type 410 by austenitic stainless steel AISI Type 316 is acceptable.

## 7.9 Bolting

7.9.1 Body-to-bonnet bolting shall be in accordance with NACE MR0175 / ISO 15156.

7.9.2 The material for gland and yoke bolting shall be at least equal to ASTM A307, Grade B.

## 7.10 Stem Packing

Stem packing shall consist of:

**End Rings** - Expanded pure graphite 'braided' packing reinforced with Inconel wire and a sacrificial corrosion inhibitor;

**Intermediate Rings** - A flexible pure graphite die-formed gland packing with a sacrificial corrosion inhibitor (optional) with low chloride-sulfur-ash content.

## 8 Operation

8.1 Gear operators are required for valve sizes and ratings found in Table 1.

**Table 1**

Pressure Class	NPS (in.)
150 & 300	10 and larger
600	6 and larger
900	4 and larger
1500	3 and larger

8.2 For power operation, refer to 04-SAMSS-035.

## 9 Testing and Inspection

Refer to 04-SAMSS-035 and 04-SAMSS-048.

## 10 Marking

Refer to 04-SAMSS-035.

## 11 Shipment

Refer to 04-SAMSS-035.

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**Revision Summary**

11 October 2010

Revised the "Next Planned Update." Reaffirmed the contents of the document, and reissued with editorial revision to reflect the changes in committee members list.



## **Appendix A – Requirements for Pressure Seal Globe Valves**

(Addition - Applicable only when specified)

- 1) Valves shall be supplied in accordance with the applicable portions of API STD 600 (1997 10<sup>th</sup> Edition) Appendix A.
- 2) For steam, boiler feed water systems and other clean and non-corrosive services, both Style A and B valves are acceptable.
- 3) For other services, Style B (heavy duty) shall be provided.
- 4) The requirement to meet NACE MR0175/ISO 15156 is not mandatory for valves supplied under this appendix, unless otherwise specified.

## **Appendix B – Low Temperature Services from -45 to -18°C**

(Applicable only when specified)

Additional requirements for valves for low temperature service from -45 to -18°C:

- 1) The requirement to meet NACE MR0175/ISO 15156 is not mandatory for valves supplied under this appendix, unless otherwise specified.
- 2) The valves shall meet the requirements of 04-SAMSS-003.
- 3) The trim shall be stainless steel AISI Type 304 or 316. The seat ring shall be hardfaced with Stellite No. 6 or equal.

## **Appendix C – Cryogenic Temperature Service from -120 to -46°C**

(Applicable only when specified)

Additional requirements for valves in cryogenic temperature services from -46°C and below:

- 1) The requirement to meet NACE MR0175/ISO 15156 is not mandatory for valves supplied under this appendix.
- 2) The valves shall be made entirely of stainless steel AISI Type 304 or 316. The seat ring shall be hardfaced with Stellite No. 6 or equal.
- 3) Body-to-bonnet bolting, gland bolts, gland bolt retainers and cover to yoke bolting shall be austenitic stainless steel per the ASTM A320 series. The corresponding nuts shall be of the ASTM A194 Grade 8 series.
- 4) Stem packing, in hydrocarbon services, shall be as called out in the main specification.
- 5) Valves shall meet the requirements of BS 6364 (non-cold box applications).

## **Appendix D – Steam Service**

(Applicable only when Specified)

Additional requirements for valves for steam service:

- 1) The requirement for valves to meet NACE MR0175/ISO 15156 is not mandatory for valves supplied under this appendix.
- 2) Integral or welded-in seats hardfaced with Stellite No.6 or No.21 are required.
- 3) Both the body (or seat ring) and disc seating surfaces shall be hardfaced with Stellite No. 6 or No. 21.
- 4) Pressure seal bonnet valves shall comply with Appendix A.
- 5) Minimum body and bonnet wall thickness shall be in accordance with ASME B16.34.