



Materials System Specification

04-SAMSS-001

11 October 2010

Gate Valves

Document Responsibility: Valves Standards Committee

Saudi Aramco DeskTop Standards

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Revised paragraphs are indicated in the right margin

Primary contact: Shiha, Saad Mohammed on 966-3-8760163

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I Scope

This specification, along with the purchase order, defines the minimum requirements for steel, bolted bonnet, pressure seal bonnet, flanged and butt-welding end gate valves of outside screw and yoke (OS&Y) construction. Included are nominal pipe sizes (NPS) 1 through 24 for Classes 150 through 2500, as covered by API STD 600, with the addition of sizes NPS 26 through 60 for Classes 150 through 600.

The 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 applications are covered in the following appendices:

- Appendix A Requirements for Pressure Seal Gate Valves*
- Appendix B Low Temperature Services from -45 to -18°C*
- Appendix C Cryogenic Temperature Services from -45°C and below*
- Appendix D Steam Services*

II Conflicts and Deviations

- A. 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.
- B. 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.

III 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.

A. 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 Forms and Data Sheets

Form 6233-1-ENG *Valve Data Sheet*

B. Industry Codes and Standards

American Petroleum Institute

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

API STD 602 *Steel Gate, Globe and Check Valves for Sizes DN
100 and Smaller for the Petroleum and Natural
Gas Industries*

American Society of Mechanical Engineers

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

British Standards Institute

BS 6364

Valves for Cryogenic Service

National Association of Corrosion Engineers/International Organization for Standards

NACE MR0175/ISO 15156

*Petroleum and Natural Gas Industries –
Materials for Use in H₂S Containing
Environments in Oil and Gas Production*

IV 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)

Commentary Note:

Refer to 04-SAMSS-035 for flanged valves greater than NPS 24.

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. Whether a split wedge or double-disc gate 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 Appendix E, specify if service fluid will be liquid or gas
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15. For pressure seal gate valves, style A or B shall be specified (see Appendix A).

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.

V Modifications to API STD 600, Steel Gate Valves - Flanged and Butt-Welding Ends, Bolted and Pressure Seal Bonnets

The following paragraph numbers refer to API STD 600, 11th Edition, 2001, which is part of this specification. The text in each paragraph below is an addition, exception, modification, or deletion to API STD 600 as noted. Paragraph numbers not appearing in API STD 600 are new paragraphs to be inserted in numerical order.

All Valves shall meet the applicable requirements of 04-SAMSS-035.

Section 5 - Design

5.1.3 (Addition) The body wall thickness of carbon steel and alloy steel valves NPS 26 and larger shall conform to ASME B16.34, Table 3, with the addition of 6.35 mm minimum.

5.3.1.1 (Addition)

- a) End flange dimensions for valves NPS 26 and larger shall be in accordance with 04-SAMSS-035.
- b) The flange facing finish shall be in accordance with 04-SAMSS-035.

5.3.1.2 (Addition)

- a) The face-to-face dimensions of raised face flanged valves, NPS 26 and larger, shall be in accordance with Table 1.

**Table 1 – Face-to-Face Dimensions of RF Flanged Valves,
 NPS 26 and Larger**

NPS (in)	Class 150 (mm)	Class 300 (mm)	Class 400 (mm)	Class 600 (mm)
26	559	1245	1308	1448
28	610	1346	1379	1549
30	610	1397	1524	1651
32	660	1524	1651	1778
34	711	1626	1778	1930
36	711	1727	1880	2082
40	762	1930	-	2286
42	787	1981	-	2438
48	864	2235	-	2540
50	-	-	-	2540
52	1016	-	-	-
54	1067	-	-	-
56	-	2438	-	2692

b) Where face-to-face or end-to-end dimensions are not indicated, the Vendor shall request prior approval from the Purchaser.

5.3.3.1 (Addition) The minimum inside diameter of the seat opening for valves NPS 32 and larger, for pressure Classes 150 through 600, shall be in accordance with Table 2.

**Table 2 – Minimum inside Diameter of Seat Opening for Valves
 NPS 32 inch and Larger, Classes 150 through 600**

NPS (in)	Inside Diameter of Flanged Valves (Min)		
	Class 150/300 (mm)	Class 400 (mm)	Class 600 (mm)
32	781	762	743
34	832	810	787
36	876	857	838
38	927	902	876
40	978	951	925
42	1022	1003	978
44	1073	1051	1029
46	1118	1099	1080
48	1168	1150	1130
54	1315	--	--
60	1461	--	--

- 5.6.1.2 (Exception) A one-piece flexible wedge shall be supplied for all valves NPS 6 and larger.
- 5.6.6 (Addition) Wear travel for valves NPS 26 and larger shall conform to Table 3.

Table 3 – Wear Travel for Valves NPS 26 inch and Larger

Valve Size NPS (in)	Minimum Wear Travel (mm)
26 through 36	19.0
38 through 48	25.4
50 through 60	32.0

- 5.8.13 (Addition) Stem nut bearings with a grease fitting shall be supplied per Table 4.

Table 4 – Additional Stem Nut Bearing Requirements

Class	N P S (in)
150	24 and over
300	16 and over

- 5.9.5 (Exception) The packing gland may be of the one-piece design only for valves in NPS 1 and 1-½ inch supplied in accordance API STD 602.
- 5.11.5 (Addition) Gear Operators are required for sizes and pressure ratings in Table 5. For power operation requirements refer to 04-SAMSS-035.

Table 5 – Gear Operator Requirements

Pressure Class	NPS (in)
150	20 and over
300	14 and over
400	10 and over
600	8 and over
900 and higher	6 and over

Section 6 - Material

(Addition) 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, plating or coatings.

6.1 (Modification)

- a) Body and bonnet shall be cast steel in accordance with ASTM A216 Grade WCB or WCC, or forged steel in accordance with ASTM A105.
- b) 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
- c) Body-to-bonnet bolting shall be in accordance with NACE MR0175 / ISO 15156.

6.2 (Modification) Trim shall be stainless steel AISI Type 410 with hardfaced seat ring or body seat ring areas, i.e., API trim No.8.

Acceptable alternatives are:

- a) AISI Type 304 or 316 with hardfaced seat ring, i.e., API trim No. 12.
- b) Hardfaced wedge with hardfaced seat ring, i.e., API trim No. 5.

Commentary Note:

For all API STD 600 trim numbers, it is acceptable to have seat or gate base materials equal to the body material. The specified trim material (if different from the body material) can then be overlaid on the seating surfaces.

Section 7 - Testing, Inspection, And Examination

(Exception) Refer to 04-SAMSS-035 and 04-SAMSS-048.

Section 8 - Marking

(Exception) Refer to 04-SAMSS-035.

Section 9 - Preparation for Dispatch

(Exception) Refer to 04-SAMSS-035.

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 Gate Valves

(Addition - Applicable only when specified)

- 1) Valves shall be supplied in accordance with API STD 600 (1997 10th 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

(Addition - 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 (API STD 600 Trim No. 12).

Appendix C – Cryogenic Temperature Services from -46°C and below

(Addition - Applicable only when specified)

Additional requirements for valves for cryogenic temperature service from:

- 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 (API STD 600 Trim No. 12).
- 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) A 3-5 mm hole shall be drilled in the upstream side of the closure element to relieve excess cavity pressure. The flow direction shall be clearly marked on the body.
- 6) Valves shall meet the requirements of BS 6364 (non-cold box applications)

Appendix D – Steam Services

(Addition - Applicable only when specified)

Additional requirements for valves for steam service:

- 1) The requirement 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) For valves Class 600 and higher, body, wedge and backseat seating surfaces shall be hardfaced with Stellite No.6 or No.21 (API Trim No. 5).
 - 4) Pressure seal bonnet valves are acceptable and shall comply to Appendix A.
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