



Materials System Specification

04-SAMSS-041

11 October 2010

Expanding Plug Valve

Document Responsibility: Valves Standards Committee

Saudi Aramco DeskTop Standards

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1 Scope

This specification together with the Purchase Order covers the minimum requirements for steel, double block and bleed, non-lubricated plug valves with retracting soft seals (expanding plug valves) in nominal pipe size (NPS) 2 through 36 inch for ASME Classes 150 through 900.

Valves covered by this specification shall be suitable for non-sour hydrocarbon services between temperatures of -18 and 120°C.

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 Manager, 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 Manager, Consulting Services Department, of Saudi Aramco, Dhahran.

3 References

Material or equipment supplied to 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 Saudi Aramco Engineering Requirement

Saudi Aramco Materials System Specifications

04-SAMSS-003

Low Temperature Valves

04-SAMSS-035

General Requirements for Valves

04-SAMSS-048

Valve Inspection and Testing Requirements

3.2 Industry Codes and Standards

American Petroleum Institute

API SPEC 6D

Specification for Pipeline Valves

<i>API SPEC 6FA</i>	<i>Specification for Fire Test for Valves</i>
<i>API STD 599</i>	<i>Steel Plug Valves Flanged or Butt welding Ends</i>
<i>API STD 607</i>	<i>Fire Test for Soft Seated Quarter-Turn Valves</i>

American Society of Mechanical Engineers

<i>ASME B16.34</i>	<i>Valves-Flanged, Threaded, and Welding End</i>
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American Society for Testing and Materials

<i>ASTM A193</i>	<i>Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service</i>
<i>ASTM A194</i>	<i>Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service</i>
<i>ASTM A395</i>	<i>Specification for Ferritic Ductile Iron Pressure-Retaining Castings at Elevated Temperatures</i>
<i>ASTM A436</i>	<i>Specification for Austenitic Grey Iron Castings</i>
<i>ASTM A439</i>	<i>Specification for Austenitic Ductile Iron Castings</i>
<i>ASTM A536</i>	<i>Specification for Ductile Iron Castings</i>

National Association of Corrosion Engineers/International Standardization Organization

<i><u>NACE MR0175/ISO 15156</u></i>	<i>Petroleum and Natural Gas Industries-Materials for use in H₂S-Containing Environments in Oil and Gas Production</i>
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British Standards Institute

<i>BS 6755</i>	<i>Testing of Steel Valves</i>
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4 General

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

5 Design

- 5.1 Valves shall have pressure ratings in accordance with ASME B16.34.
 - 5.2 The minimum wall thickness of valve bodies up to NPS 24 inch shall be in accordance with API STD 599. Wall thicknesses for valve bodies above
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- NPS 24 inch shall require approval by the Chairman of the Valves Standards Committee.
- 5.3 The port area shall be rectangular or round and at least approximately 50% of full bore unless otherwise specified in the Purchase Order. Deviations shall require approval by the Chairman of the Valves Standards Committee.
 - 5.4 Flanges shall be integral with the body.
 - 5.5 Face-to-Face and end-to-end dimensions shall be in accordance with API SPEC 6D, Table 4.1 (Gate Valves). When Vendor's standard dimensions do not meet this requirement or when size is above NPS 16 inch in Class 150, approval is required by the Chairman of the Valves Standards Committee.
 - 5.6 When the Purchase Order specifies full bore round port valves, face-to-face and end-to-end dimensions shall be per Vendor's standard as approved by the Chairman of the Valves Standards Committee.
 - 5.7 Valves shall be qualified "fire-safe" to one of the following standards when specified in the Purchase Order: API SPEC 6FA, API STD 607, BS 6755 Part 2.
 - 5.8 A plug position indicator shall be provided on all valves.
 - 5.9 Sealing shall be accomplished using seating segments (slips) which are held on the plug by dovetail connections. Raising the plug when in the closed position shall cause the slips to be retracted perpendicularly from the body sealing surface, thus providing clearance prior to rotation of the plug. Conversely, lowering the plug after rotation shall cause the slips to press perpendicularly against the body seat by this wedge action.
 - 5.10 The slips shall be replaceable without removing the valve from the line.
 - 5.11 The valves shall be capable of being opened and closed under full differential pressure.
 - 5.12 Stem sealing shall be achieved with packing as a primary seal in conjunction with O-rings as a secondary seal.
 - 5.13 Manual bleed to atmosphere with automatic thermal relief to upstream piping shall be provided for all valves.
 - 5.14 Valves shall be provided with a AISI Type 316L stainless steel drain valve in the body cavity at the lowest possible location and shall be fitted with a AISI Type 316L stainless steel NPT threaded plug.
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6 Materials

- 6.1 Body, bonnet, plug and lower plate shall be made of a carbon steel in accordance with API SPEC 6D, Section 3.
- 6.2 Machined surfaces of plug and body bore shall be electroless nickel plated to 75 micrometers minimum thickness. Refer to 04-SAMSS-035 for ENP quality requirements.
- 6.3 Seating segments (slips) shall be made of one of the following materials:
- a) Austenitic gray iron - ASTM A436, Type 2
 - b) Austenitic ductile iron - ASTM A439, Type D2
 - c) Ductile iron - ASTM A536
 - d) Ductile iron - ASTM A395
- 6.4 Inserts, seals and packing shall be one of the following materials or equivalent:
- a) Stem packing - graphite or TFE with FPM O-ring seals
 - b) Slip inserts and O-ring body seals - FPM
 - c) Bonnet and plate gaskets - mild steel, graphite, or spiral wound graphite filled stainless steel.
- 6.5 Mounting flanges for gear boxes and actuators shall be carbon steel or ductile iron.
- 6.6 Body, bonnet and cover bolting shall be in accordance with ASTM A193, Gr B7 for bolts and ASTM A194, Gr 2H for nuts.
- 6.7 Refer to 04-SAMSS-003 for additional requirements for low temperature service in the temperature range -45 to -18°C.
- 6.8 When wet sour service is specified in the Purchase Order, all parts, welds, and heat-affected zones of welds exposed to line fluids shall meet the hardness and heat treatment requirements as specified in NACE MR0175/ISO 15156. This includes materials under overlays, platings, or coatings.

7 Operation

- a) Gear operators shall be provided on all valves per the following:
 - All valves larger than NPS 8 inch in Class 150 and higher
 - All valves larger than NPS 6 inch in Class 300 and higher
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- All valves larger than NPS 4 inch in Class 600 and higher
- All valves in Class 900 and higher

b) For power operation requirements, refer to 04-SAMSS-035.

8 Testing and Inspection

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

9 Marking

Refer to 04-SAMSS-035.

10 Shipping

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.