SOUTHWEST GAS CORPORATION
ENGINEERING STAFF
MATERIAL SPECIFICATION

Section No:	MS D-1
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VALVES AND STOPS
Plugs, Lubricated

1. SCOPE

This specification covers cast iron and steel lubricated, positive shut-off plug valves. Cast iron valves from ½" to 12" NPS will have service pressure ratings of 175, 200, 400, 500, 800 WOG (or CWP). Steel plug valves from ½" to 36" NPS will have pressure ratings that correspond to ANSI Class 150, 300, 400, 600, 900, 1500 or 2500. Valve may be either short, regular, venturi or round port, full bore pattern.

Cast iron plug valves are used in regulator stations, meter set assemblies and other locations where the valve is not subjected to stress and vibration by external forces. Steel plug valves are used as block valves in regulator, compressor and pressure control stations and areas of known ground instability where stress and vibration by external forces is expected.

All plug valves covered by this specification, when installed as a single component, may be installed without an installation pressure test. When a pressure test is required during installation, the test pressure will not exceed the manufacturer's test pressure shown in Section 13, Approved Manufacturers, of this document.

2. APPLICABLE DOCUMENTS

2.1 American National Standards Institute (ANSI) B-1.1 “Unified Inch Screw Threads.”

2.2 American National Standards Institute (ANSI) B-1.20.1, “Pipe Threads, General Purpose (INCH).”

2.3 American National Standards Institute (ANSI) B-16.1, “Cast Iron Pipe Flanges and Flanged Fittings.”

2.4 American National Standards Institute (ANSI) B-16.5, “Pipe Flanges and Flanged Fittings.”

2.5 American National Standards Institute (ANSI) B-16.10, “Face-to-Face and End-to-End Dimensions of Valves.”

2.6 American National Standards Institute (ANSI) B-16.34, “Steel Valves Flanged and Butt-Welding Ends.”

2.7 ASTM International (ASTM) A-47, “Specification for Ferritic Malleable Iron Castings.”

2. APPLICABLE DOCUMENTS (Cont'd)

2.8 ASTM International (ASTM) A-126, "Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings."

2.9 ASTM International (ASTM) A-197, "Specification for Cupola Malleable Iron."

2.10 ASTM International (ASTM) A-283, "Specification for Low and Intermediate Tensile Strength Carbon Steel Plate."

2.11 American Petroleum Institute (API) Specification 6A, "Specification for Wellhead Equipment."

2.12 American Petroleum Institute (API) Specification 6D, "Specification for Pipeline Valves."

2.13 Manufacturers Standardization Society Standard Practice (MSS SP) 6, "Standard Finishes for Contact Surfaces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings."

2.14 Manufacturers Standardization Society Standard Practice (MSS SP) 25, "Standard Marking System for Valves, Fittings, Flanges and Unions."

2.15 Manufacturers Standardization Society Standard Practice (MSS SP) 78, "Cast Iron Plug Valves, Flanged and Threaded Ends."

2.16 Southwest Gas Material Specification (MS) B-1, "Flanges, Cast Iron and Steel."

2.17 Southwest Gas Material Specification (MS) H-7, "Valve Lubricant."

2.18 United States Department of Transportation (DOT), Code of Federal Regulations, Title 49, Part 192, "Transportation of Natural and Other Gas by Pipeline; Minimum Safety Standards."

NOTE: Unless otherwise specified, the editions of the above document incorporated by DOT 49 CFR 192 are applicable. The above documents, and parts of documents (including annexes), not incorporated by 49 CFR 192 are incorporated by this Material Specification and will be the most recent edition. If a conflict exists between the applicable documents and/or this Material Specification, the requirements of 49 CFR 192 shall govern, and in the event of all other conflicts, the more stringent requirement shall govern.

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3. TERMINOLOGY

3.1 General

3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.

3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents will mean "as determined by Southwest Gas," unless specifically stated otherwise.

3.1.3 "Product Information Package" or "PIP" wherever used in this specification or other related documents will mean the required technical product information that a manufacturer must submit to SWG to determine if the product is suitable for use by SWG, unless specifically stated otherwise.

3.2 CWP for steel valves will mean "Cold Working Pressure" and is the maximum service pressure permitted in the ambient temperature range of -20°F to 100°F (-29°C to 38°C). CWP is expressed in psig (pounds per square inch gage).

3.3 CWP for cast iron valves will mean "Cold Working Pressure" and is the maximum service pressure permitted in the ambient temperature range of -20°F to 100°F (-29°C to 38°C). CWP is expressed in psig (pounds per square inch gage).

3.4 WOG will mean "Water, Oil and Gas" and is equivalent to CWP for steel valves in paragraph 3.2 and for cast iron valves in paragraph 3.3.

3.5 API Specification 6D4 refers to valves with end-to-end, face-to-face or end-to-face dimensions that are shorter or longer than the standard API Specification 6D dimensions.

3. TERMINOLOGY (Cont'd)

3.6 The following are ANSI Class ratings which correspond to cold working pressures (CWP) as recognized by Southwest Gas:

ANSI CLASS	CWP psig
150	275
300	720
400	960
600	1440
900	2160
1500	3600
2500	6000

TABLE D-1.1

4. MATERIALS AND MANUFACTURING

4.1 Plug valves purchased under this specification will meet the minimum requirements of DOT 49 CFR 192 and the applicable standards of API Specification 6A, API Specification 6D or MSS SP 78 in addition to the requirements defined in this specification.

4.1.1 All steel valves will be hydrotested in accordance with API 6D unless the testing procedure is specifically approved by Southwest.

4.1.2 Valve testing records will be documented in one of the following methods:

- Stamped on the valve.
- Retained by the manufacturer and retrievable when provided the valve serial number.

4.2 Cast-Iron Plug Valves

4.2.1 Cast iron plug valves will meet the requirements of MSS SP 78.

4.2.2 The valve body and plug will be made of ASTM A-126, Grade B or C, gray cast iron.

4.2.3 Covers and bonnets will be made of one of the following materials:

- ASTM A-126, Grade B
- ASTM A-47, Grade 32510
- ASTM A-197
- ASTM A-283, Grade D

4.2.4 Flanges will conform to Southwest Gas MS B-1 for cast iron flanges. ANSI Class 125 cast iron valve flanges will be flat face; all other ANSI class flanges will be raised faced in accordance with MSS SP 6.

4.2.5 Thread ends will conform to ANSI B-1.20.1 or the line pipe thread requirements of API Specification 6A.

4.2.6 Cast iron plug valves will be rated with WOG or CWP pressure rating.

4. MATERIALS AND MANUFACTURE (Cont'd)

4.3 Steel Plug Valves

4.3.1 Steel plug valves will be made in accordance with API Specification 6D and with materials covered therein.

4.3.2 Flanges will conform to Southwest Gas MS B-1 for steel flanges.

4.3.3 Thread ends will conform to the line pipe thread requirements of API Specification 6A and ANSI B-1.20.1.

4.3.4 Weld ends will conform with ANSI B-16.34

4.4 The stem gland will be a screwed, a bolted solid or a bolted two-piece self-aligning type.

4.5 The bearing surface and seating material will be selected and/or processed to minimize galling and wear due to sliding contact.

4.6 Valves will be supplied with a giant combination buttonhead lubricant fitting compatible with Rockwell/Nordstrom 400 giant buttonhead coupler.

4.7 A 2-inch square adaptor will be attached on the shank of wrench operated valves 2-inch and larger when specified on the purchase order. This will be used with an extension-type wrench to operate buried valves.

4.8 Any flanges that need to be tapped due to inadequate space will conform to ANSI B-16.1 and ANSI B-16.5. Threads will meet the requirements of ANSI B-1.1, Class 2B with coarse threads on 1 1/8-inch (28.58 mm) and larger holes.

4.9 Plug valves with an operating torque over 200 foot-pounds (271.2 n(m) will be available with worm gearing. Hand wheels will be marked with the direction of movement necessary to open the valve.

4.10 Upon agreement between the supplier and Southwest Gas, the valves will have a protective coating other than primer. This coating may be paint, epoxy or other corrosion and holiday inhibitors and will be specified on the purchase order. Coatings may be required to pass a holiday test outlined in paragraph 5.3 of this specification.

5. PERFORMANCE REQUIREMENTS

5.1 The valve will be compatible with a lubricant that conforms to Southwest Gas MS H-7. The valve will be capable of being lubricated in the fully open or closed position while in service. All valves will be delivered from the manufacturer lubricated with the specified lubricant.

5.2 The plug valve will close in a clockwise direction. Stops will be provided to limit rotation to 90° from full open to full close. A position indicator will be supplied on the stem of the valve.

5.3 When specified by Southwest Gas, epoxy or other electrically insulating coatings will pass a holiday detection test applicable for the specified type of coating.

5.4 Cast Iron Plug Valves

5.4.1 Each cast iron plug valve will pass a hydrostatic shell test specified in MSS SP 78 before painting and shipping. The test pressure will be no less than two (2) times the 100°F (37.78EC) pressure rating (CWP) with no leakage allowed. Minimum durations for shell tests are shown below.

SIZE (Inches)	DURATION (Seconds)
2 – 8	30
10 – 12	60

TABLE D-1.2

5.4.2 After passing the hydrostatic shell test in paragraph 5.4.1, each valve will be subjected to a hydrostatic seat test. The test pressure will be no less than 1.5 times the 100°F (37.78°C) pressure rating (CWP). Minimum durations for seat tests are shown below:

SIZE (Inches)	DURATION (Seconds)
2 – 8	30
10 – 12	60

TABLE D-1.3

5. PERFORMANCE REQUIREMENTS (Cont'd)

5.5 Steel Plug Valves

5.5.1 Each steel plug valve will pass a hydrostatic shell test specified in API Specification 6D before painting and shipping. The test pressure will be no less than 1.5 times the 100°F (37.78°C) pressure rating with no leakage allowed. Minimum durations for shell tests are shown below:

SIZE (Inches)	DURATION (Minutes)
2 – 4	2
6 – 10	5
12 – 18	15

TABLE D-1.4

5.5.2 After passing the hydrostatic shell test in paragraph 5.5.1, each steel valve will be subjected to a hydrostatic seat test specified in API Specification 6D. The test pressure will be no less than 1.1 times the 100°F (37.78°C) pressure rating. Minimum durations for seat tests are shown below:

SIZE (Inches)	DURATION (Minutes)
2 – 4	2
6 – 10	5
12 – 18	5
20 and longer	5

TABLE D-1.5

5.6 Wrench-operated plug valves must be available with a compatible locking or tamper-proof device. When locked with a padlock or barrel lock, valve operation must be prevented.

6. DIMENSIONS AND TOLERANCE

6.1 Flange dimensions and tolerances will conform to Southwest Gas MS B-1 and ANSI B-16.5.

6.2 Thread end dimensions and tolerances will conform to ANSI B-1.20.1 and API Specification 6A.

6.3 Weld end dimensions and tolerances will conform to ANSI B-16.34.

6.4 Face-to-face, end-to-end and face-to-end dimensions and tolerances will be in accordance to ANSI B-16.10 or API Specification 6D and are shown in Appendix A of this document.

7. INSPECTION

7.1 Successful review of the Product Information Package (PIP) as well as any future reference by SWG to the seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found and will not relieve the seller from meeting all the requirements of this specification.

7.2 SWG retains the option to inspect the manufacturing and testing of all materials, products or systems referenced in this specification that are sold to SWG.

7.3 SWG will make appropriate inspections and tests of all materials, products or systems supplied to this specification. SWG will have the right, at their option, to reject any material which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after SWG assumes possession. Notice of the rejection will be made promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.

7.4 Any changes in the manufacturing of previously-approved plug valves covered under this document for sale to SWG must be approved by SWG's Engineering Staff. **Failure to obtain SWG's approval may be cause for rejection and disqualification as an approved supplier**.

8. CERTIFICATION

The manufacturer's or supplier's certification will be supplied to Southwest. This certification will state that samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that the requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

For components with material yield strength grades of 42,000 psi (X42) or greater and with nominal diameters of greater than 2 inches, testing documentation demonstrating the physical characteristics of the components which include, at a minimum, diameter, yield strength, ultimate tensile strength, wall thickness, seam type and chemical composition shall be provided to Southwest in accordance with 49 CFR 192.

Upon the request of Southwest, the certification of an independent third-party indicating conformance to the specification may be considered at Southwest's expense.

9. SAFETY DATA SHEETS

In accordance with law, the Seller will supply Safety Data Sheets for all applicable items supplied under this specification to the following:

1) The Receiving Location
2) Engineering Staff
3) Southwest Gas Corporation
   Corporate Safety
   Mail Station LVA-120
   P.O. Box 98510
   Las Vegas, NV 89193-8510

10. PRODUCT MARKING

All valves will be marked according to MSS SP 25, “Standard Marking System for Valves, Fittings, Flanges and Unions.” All valves will be marked in English units.

11. PACKAGING AND PACKAGE MARKING

All threaded plug valve ends will be free of paint and be plugged with thread protectors. Flange ends and welded ends will have a suitable protector to prevent damage to contact surfaces and prevent contamination of the valve. Each flange contact face will be free of protective coating.

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12. STOCK CLASSIFICATION DESCRIPTION

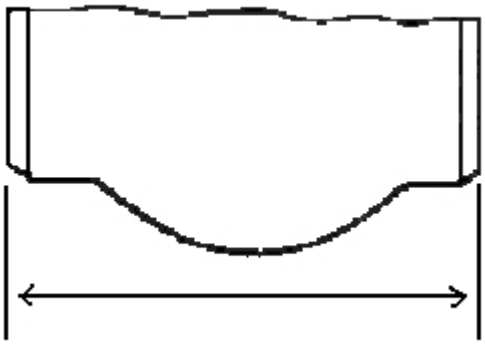
Cast Iron Plug Valves

VALVE, PLUG, _____ (MATERIAL, i.e., IRON OR SEMI-STEEL), _____ INCH WITH _____ ENDS (FLANGE OR THREADED), _____ WOG/CWP IN _____ PATTERN (REG, SHORT, RND-FULL), _____ (COATING IF OTHER THAN PRIMER, i.e., EPOXY OR MANUFACTURER BRAND) _____ LUBRICANT (OPTIONAL).

Steel Plug Valves

VALVE, PLUG, STEEL, _____ INCH WITH _____ ENDS (FLANGE, THREADED, WELD OR COMBINATION), ANSI CLASS _____, OTHER THAN PRIMER, i.e., EPOXY OR MANUFACTURER BRAND), _____ LUBRICANT (OPTIONAL).

APPENDIX A

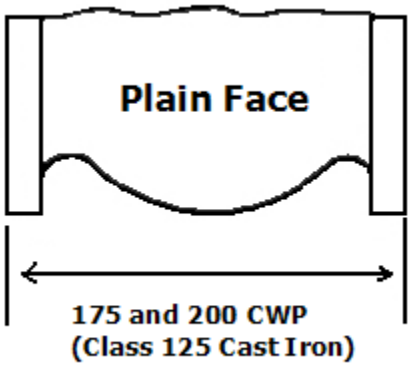


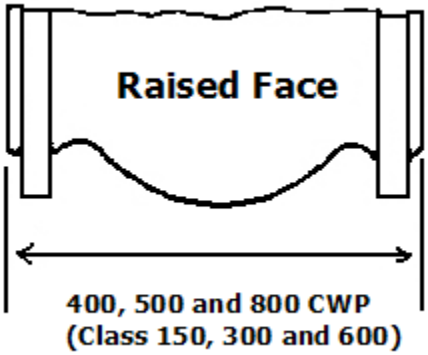
END-TO-END DIMENSIONS FOR THREADED VALVES
(All dimensions are in inches)

Valve Size, NPS	200 CWP		400 CWP	500 CWP	800 CWP	Class 150	Class 300	Class 600
	Short	Regular	Short	Regular	Regular	Short	Short	Regular
1/2	4.50	3.50	3.75	3.80	3.80	3.75	4.25	4.25
3/4	4.50	3.75	3.75	3.80	3.80	3.75	4.25	4.25
1	4.50	4.38	4.38	4.90	4.90	4.50	4.50	4.50
1 1/4	5.00	5.00	4.75	5.40	6.60	–	5.50	–
1 1/2	5.00	5.25	5.13	6.80	6.60	5.50	5.50	5.75
2	5.88	6.00	6.50	8.00	8.10	7.25	7.25	7.25

TABLE D-1.16

APPENDIX A



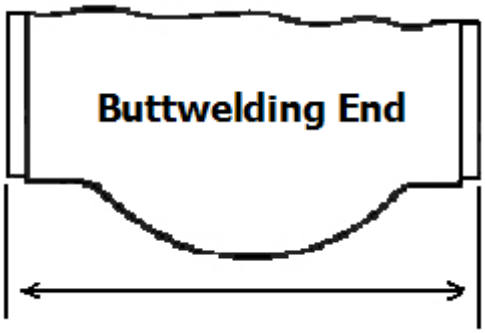


FACE-TO-FACE DIMENSIONS FOR FLANGED END VALVES (All dimensions are in inches)

Valve Size, NPS	200 CWP & Class 150		400 CWP	500 CWP	Class 300	Class 600
	Short	Regular	Short	Regular	Short	Regular
1/2	–	–	–	–	–	6.50
3/4	–	–	–	–	–	7.48
1	5.50	5.50	–	6.25	6.25	8.50
1 1/4	6.50	6.50	–	–	–	–
1 1/2	6.50	6.50	–	7.50	7.50	9.50
2	7.00	7.50	7.25	8.50	8.50	11.50
2 1/2	7.50	8.25	8.00	9.50	9.50	13.00
3	8.00	9.00	9.25	11.12	11.12	14.00
4	9.00	12.00	10.50	12.00	12.00	17.00
6	10.50	15.50	14.88	16.75	15.88	22.00
8	11.50	18.80	–	19.75	16.50	26.00

TABLE D-1.17

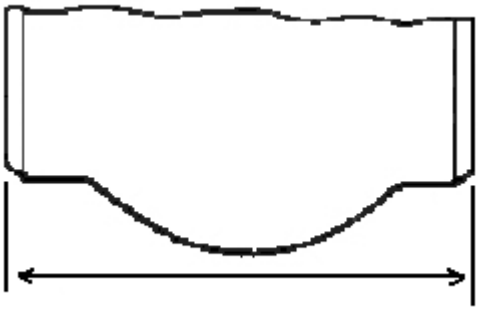
APPENDIX A
(Cont'd)



END-TO-END DIMENSIONS FOR WELD END VALVES (All dimensions are in inches)				
Valve Size, NPS	200 CWP	Class 150/300		Class 600
	Short	Short	API6D4	Regular
1	4.50	–	–	8.50
1 1/4	5.00	–	–	9.00
1 1/2	–	9.50	–	9.50
2	7.00	10.50	11.50	11.50
2 1/2	–	12.00	–	13.00
3	8.00	13.00	14.00	14.00
4	9.00	14.00	17.	17.00
6	–	18.00	–	22.00
8	–	20.50	16.50	26.00

TABLE D-1.18

APPENDIX A
(Cont'd)



FACE-TO-END DIMENSIONS FOR WELD X FLANGE VALVES (All dimensions are in inches)				
Valve Size, NPS	200 CWP	Class 300		Class 600
	Short	Short	API6D4	Regular
1	–	–	–	8.50
1 1/4	–	–	–	–
1 1/2	–	8.50	–	9.50
2	7.75	9.50	11.19	11.50
2 1/2	–	–	–	13.00
3	9.56	12.05	13.68	14.00
4	10.50	13.00	16.56	17.00
6	–	–	15.88	22.00
8	–	–	16.50	26.00

TABLE D-1.19