



SOUTHWEST GAS CORPORATION

ENGINEERING STAFF

MATERIAL SPECIFICATION

Prepared By: Engineering Staff

Approved By: Jerome T. Schmitz

Section No:	MS B-10
Page No.:	1 of 12
Issue Date:	10/05/18
Superseded Date:	12/11/15

PIPE FITTINGS

Forged Branch Outlet Fittings

1. SCOPE

This specification covers 1/8-inch through 2-inch forged steel threaded fittings with class ratings of 2000 and 3000 pound shown in Table 1. Pressure ratings for forged steel threaded fittings are found in the Operations Manual under "Selection of Materials and Design/Threaded Pipe and Fittings."

All forged steel threaded fittings covered by this specification must be tested in accordance with the Operations Manual's Pipe and Component Testing sections.

TYPES OF THREADED FORGED STEEL FITTINGS BY CLASS AND SIZE RANGE (Size in inches)		
Description	2000 Lb. Class	3000 Lb. Class
45° - 90° Elbows,	1/8 - 2	1/8 - 2
Tees, Crosses,	1/8 - 2	1/8 - 2
Couplings,	—	1/8 - 2
Half Couplings,	—	1/8 - 2
Caps	—	1/8 - 2
Square, Hex, Round Plug	1/8 - 2 [1]	1/8 - 2 [1]
Hex and Flush Bushings	1/8 - 2 [1]	1/8 - 2 [1]

NOTES:
 [1] Plugs and bushings are not identified by class. They may be used for ratings up through Class 6000.
 [2] 3000 Lb. Class may be substituted for the 2000 Lb. Class.

TABLE B-10.1



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2. APPLICABLE DOCUMENTS

- 2.1 American National Standard Institute (ANSI) B-1.20.1, "NPT American National Standard Taper Pipe Thread."
- 2.2 American National Standard Institute (ANSI) B-16.11, "Forged Fittings, Socket-Welding and Threaded."
- 2.3 American National Standard Institute (ANSI) Z-55.1, "Finishes for Industrial Apparatus and Equipment."
- 2.4 ASTM International (ASTM) A-105, "Standard Specification for Carbon Steel, for Piping Applications."
- 2.5 ASTM International (ASTM) A-153, "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
- 2.6 ASTM International (ASTM) A-370, "Standard Test Methods and Definitions for Mechanical Testing of Steel Products."
- 2.7 Title 49, Code of Federal Regulations, Part 192, "Transportation of Natural and Other Gas by Pipeline; Minimum Safety Standards" (49 CFR 192).

NOTE: Unless otherwise specified, the editions of the document incorporated in whole or in part by 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. In the event 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 and other related documents will mean the required information that a manufacturer must submit to SWG to determine if the product is suitable for use by SWG, unless specifically stated otherwise.
- 3.1.4 The term “forged steel” as defined by ASTM A-105.

4. MATERIALS AND MANUFACTURING

- 4.1 Fittings purchased to this specification will be manufactured, as a minimum, in accordance with ANSI B-16.11, ASTM A-105 and any additional requirements as defined in this specification.
- 4.2 Unless otherwise specified, all threaded pipe fittings shall be coated with an Industrial Gray Coating No. 49 per ANSI Z-55.1. The paint system used shall be one of the systems listed in Tables B-10.2 and B-10.3 or a pre-approved equivalent.
- 4.3 Where galvanized fittings are specified, galvanizing shall be applied by the hot-dipped process and shall conform to the requirements of ASTM A-153. The zinc coating shall be applied prior to threading.



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4. MATERIALS AND MANUFACTURING (Cont'd)

- 4.4 All fittings shall have tapered threads and shall be threaded in accordance with ANSI B-1.20.1.
- 4.5 The coating shall be a minimum of 5 mils thick, unless otherwise approved by Southwest Gas due to the coating process.
- 4.6 The coating will cover no more than 4 threads. There must not be any major coating build-up on the threads. Overspray beyond the first 4 threads and on female threads is allowable so long as it does not exceed 0.5 mil film thickness.

APPROVED PAINT SYSTEMS				
SYSTEM NUMBER	SURFACE PREPARATION	PRIMER COAT	INTERMEDIATE COAT	FINISH COAT
1	Solvent Cleaning (SPC-SP 1) THEN Power Tool Cleaning (SSPC-SP 3) Rusted Spots	High-Build Polyamide Epoxy, DFT 4.0 to 5.0 Mils.	None	Aliphatic Polyurethane, DFT 2.0 to 3.0 Mils.
2	Solvent Cleaning (SSPC-SP-1) THEN Power Tool Cleaning (SSPC-SP 3) Rusted Spots	Modified Alkyd, Inhibited, Chromate and Lead-Free, DFT 2.0 Mils	Alkyd Enamel, DFT 1.5 to 2.0 Mils.	Alkyd Enamel, DFT 1.5 to 2.0 Mils.
3	Solvent Cleaning (SSPC-SP 1) THEN Power Tool Cleaning (SSPC-SP 3) Rusted Spots	Aluminum Flake Epoxy Mastic, DFT 4.0 to 5.0 Mils.	None	Aliphatic Polyurethane, DFT 2.0 to 3.0 Mils.

TABLE B-10.2



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4. MATERIALS AND MANUFACTURING (Cont'd)

APPROVED PAINT SYSTEMS MANUFACTURER'S PART NUMBERS				
SYSTEM NUMBER	CARBOLINE	SHERWIN WILLIAMS	RUSTOLEUM	KRYLON
1 ¹	801	B58 T 104	9100 SERIES	
	834	B65 W 300	9400 SERIES	
2 ¹	GP-818	B50 HZ 1	7669	00691
	Subsil B	B56 Series	7686	00871
3 ¹	Carbomastic 15	B62 S 100		
	834	B65 W 300 Series		

NOTE: ¹ For each paint system, the top part number is for the primer and the bottom Part number is for the top coat.

TABLE B-10.3

5. PERFORMANCE REQUIREMENTS

5.1 All Steel used to make fittings to this specification will meet the tensile requirement of ASTM A-105. Testing procedures will conform to the requirements of ASTM A-370. All testing will include the yield strength and elongation at room temperature. Southwest may, at their discretion, require the results of such tests if specified on the purchase order.

5.2 All fittings under this specification will be capable of withstanding a leak test at a pressure level not less than the maximum operating pressure.

6. DIMENSIONS AND TOLERANCES

All steel fittings manufactured to this specification will meet the dimension and tolerance requirements of ANSI B-16.11.



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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 requirements of this specification.
- 7.2 SWG retains the option to inspect the manufacture and testing of the items covered in this specification sold to SWG.
- 7.3 SWG will make appropriate inspections and tests of any and 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 rejection will be made promptly thereafter 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 materials, products or systems described in this specification 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 furnished to Southwest. This certification will state that samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that all requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

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



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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

10.1 Each fitting will be marked with the following:

- Manufacturer's name or trademark
- Material designation and/or B-16
- Class designation 2000 (2M), 3000 (3M) or 6000 (6M)
- Size

10.2 Each plug will be marked with the manufacturer's name or trademark, except where marking is impractical.

10.3 Markings as required above on the fittings need only be legible prior to coating by the supplier or Southwest.



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11. PACKAGING AND PACKAGE MARKING

All fittings will be packaged in a manner to prevent damage during transportation and storage.

12. STOCK CLASSIFICATION DESCRIPTION

ELBOW, TEE, CROSS, COUPLING, HALF COUPLING, CAP, PLUG, BUSHING, (45°, 90°), _____ (Reducing), FORGED STEEL, GRAY COATED, _____-INCH, STANDARD WALL THICKNESS, _____ (2000, 3000) LB CLASS, THREADED TAPERED.



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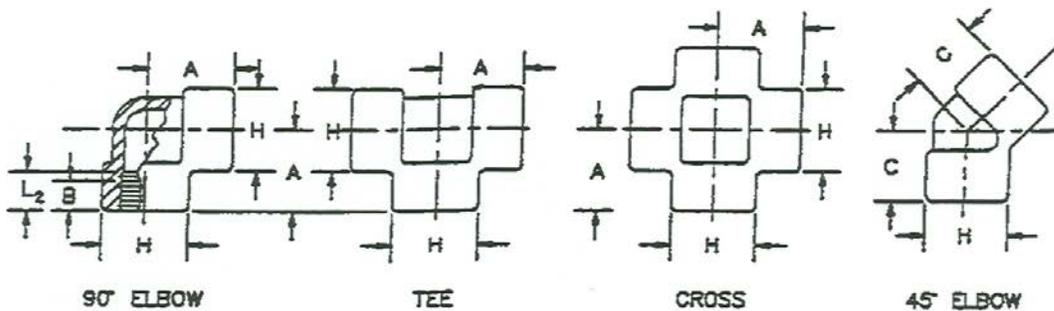
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**APPENDIX A
 FORGED STEEL THREADED FITTINGS**



FORGED STEEL THREADED FITTINGS														
Nominal Pipe Size	Center to End Elbows, Tees and Crosses			Center to End 45° Elbow			Outside Diameter of Band			Minimum Wall Thickness			Length of Thread Min [1]	
	A			C			H			G				
	2000	3000	6000	2000	3000	6000	2000	3000	6000	2000	3000	6000	B	L ²
1/8	0.81	0.81	0.97	0.69	0.69	0.75	0.88	0.88	1.00	0.125	0.125	0.250	0.25	0.2639
1/4	0.81	0.97	1.12	0.69	0.75	0.88	0.88	1.00	1.31	0.125	0.130	0.260	0.32	0.4018
3/8	0.97	1.12	1.31	0.75	0.88	1.00	1.00	1.31	1.50	0.125	0.138	0.275	0.36	0.4078
1/2	1.12	1.31	1.50	0.88	1.00	1.12	1.31	1.50	1.81	0.125	0.161	0.321	0.43	0.5337
3/4	1.31	1.50	1.75	1.00	1.12	1.31	1.50	1.81	2.19	0.125	0.170	0.336	0.50	0.5457
1	1.50	1.75	2.00	1.12	1.31	1.38	1.81	2.19	2.44	0.145	0.196	0.391	0.58	0.6828
1 1/4	1.75	2.00	2.38	1.31	1.38	1.69	2.19	2.44	2.97	0.153	0.208	0.417	0.67	0.7068
1 1/2	2.00	2.38	2.50	1.38	1.69	1.72	2.44	2.97	3.31	0.158	0.219	0.436	0.70	0.7235
2	2.38	2.50	3.25	1.69	1.72	2.06	2.97	3.31	4.00	0.168	0.281	0.476	0.75	0.7565
2 1/2	3.00	3.25	3.75	2.06	2.06	2.50	3.62	4.00	4.75	0.221	0.301	0.602	0.93	1.1380

NOTES: [1] Dimension B is minimum length of perfect thread. The length of useful thread (B plus threads with fully-formed roots and flat crests) shall not be less than L² (effective length of external thread). Dimensions are in inches.

TABLE B-10.4



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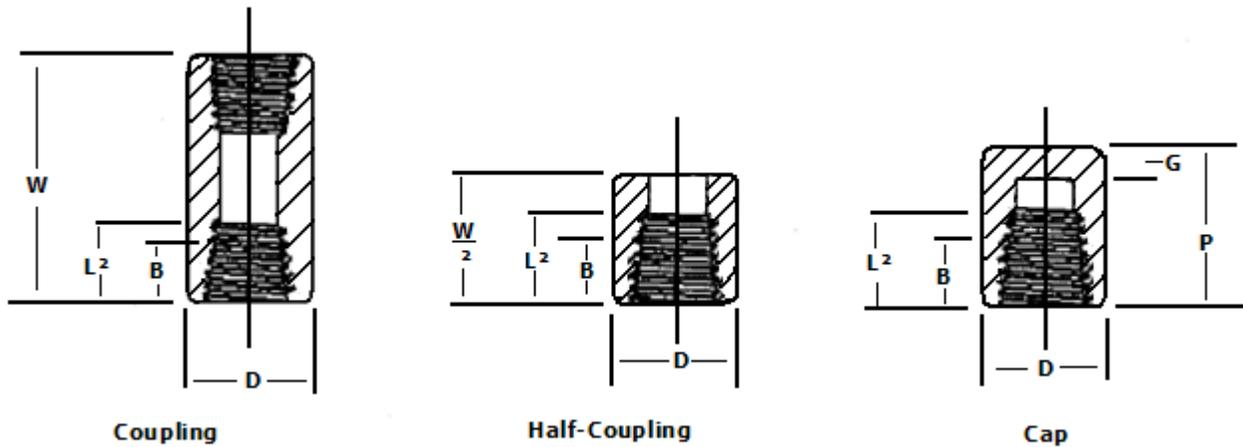
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**APPENDIX A
 FORGED STEEL THREADED FITTINGS**



APPENDIX A									
Nominal Pipe Size	End to End Couplings W 3000 & 6000	End to End Caps		Outside Diameter of Band		Minimum Wall thickness		Length of Thread Min [1]	
		P		D		G		B	L ²
		3000	6000	3000	6000	3000	6000		
1/8	1.25	0.75		0.62	0.88	0.19		0.25	0.2639
1/4	1.38	1.00	1.06	0.75	1.00	0.19	0.25	0.32	0.4018
3/8	1.50	1.00	1.06	0.88	1.25	0.19	0.25	0.36	0.4078
1/2	1.88	1.25	1.31	1.12	1.50	0.25	0.31	0.43	0.5337
3/4	2.00	1.44	1.50	1.38	1.75	0.25	0.31	0.50	0.5457
1	2.38	1.62	1.69	1.75	2.25	0.38	0.44	0.58	0.6828
1 1/4	2.62	1.75	1.81	2.25	2.50	0.38	0.44	0.67	0.7068
1 1/2	3.12	1.75	1.88	2.50	3.00	0.44	0.50	0.70	0.7235
2	3.38	1.88	2.00	3.00	3.62	0.50	0.62	0.75	0.7565
2 1/2	3.62	2.38	2.50	3.62	4.25	0.62	0.75	0.93	1.1380

TABLE B-10.5



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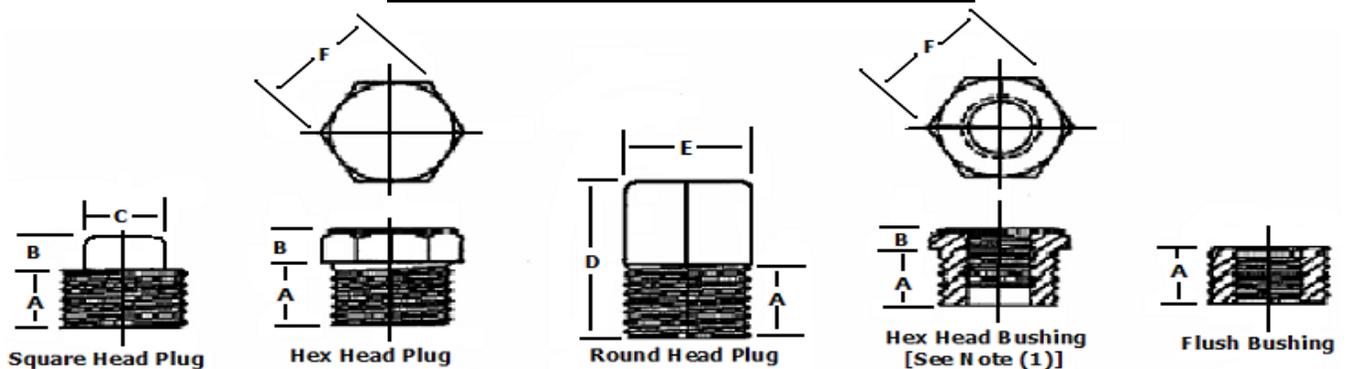
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**APPENDIX A
 FORGED STEEL THREADED FITTINGS**



PLUGS & BUSHINGS (Dimensions are in inches)								
Nominal Pipe Size	Length (Minimum) A	Plugs Square Head		Plugs Round Head		Hex Plugs & Bushings		
		Height of Square (Min) B	Width Flats (Min) C	Nominal Diameter of Head E	Length (Min) D	Width Flats (Nominal)	Hex Height (Minimum)	
							Bushing G	Plug H
1/8	0.38	0.25	0.28	0.41	1.38	0.44		0.25
1/4	0.44	0.25	0.38	0.53	1.62	0.62	0.12	0.25
3/8	0.50	0.31	0.44	0.69	1.62	0.69	0.16	0.31
1/2	0.56	0.38	0.56	0.84	1.75	0.88	0.19	0.31
3/4	0.62	0.44	0.62	1.06	1.75	1.06	0.22	0.38
1	0.75	0.50	0.81	1.31	2.00	1.38	0.25	0.38
1 1/4	0.81	0.56	0.94	1.69	2.00	1.75	0.28	0.56
1 1/2	0.81	0.62	1.12	1.91	2.00	2.00	0.31	0.62
2	0.88	0.69	1.31	2.38	2.50	2.50	0.34	0.69
2 1/2	1.06	0.75	1.50	2.88	2.75	3.00	0.38	0.75

NOTES: [1] Cautionary Note Regarding Hex Head Bushings-Hex head bushings of one-size reduction should not be used in services wherein they might be subject to harmful loads and forces other than internal pressures.

TABLE B-10.6