



SOUTHWEST GAS CORPORATION

® ENGINEERING STAFF

MATERIAL SPECIFICATION

Prepared By: Engineering Staff 

Approved By: Jerome T. Schmitz 

Section No:	MS B-12
Page No.:	1 of 16
Issue Date:	10/09/18
Superseded Date:	12/11/15

PIPE FITTINGS

Unions, Malleable Iron

1. SCOPE

This specification covers regular malleable iron pipe unions 1/8-inch through 2 1/2-inch. Insulating malleable iron pipe unions in sizes 1/8-inch through 2-inch are also covered. The following are the union designations and pressure ratings.

Unions covered under this specification, when installed as a single component, may be installed without an installation pressure test.

REGULAR UNIONS	PRESSURE RATING	INSULATING UNIONS	PRESSURE RATING
Class 150	300 psig	175 CWP	175 psig
Class 250	400 psig	Class 150	300 psig
Class 300	600 psig	600 CWP	600 psig

TABLE B-12.1

2. APPLICABLE DOCUMENTS

- 2.1 American Iron Steel Institute (AISI) 1026
- 2.2 American National Standards Institute (ANSI) B-1.20.1, "NPT American National Standard Taper Pipe Thread."
- 2.3 American National Standards Institute (ANSI) B-16.39, "Malleable Iron Threaded Pipe Unions. Classes 150, 250 and 300."
- 2.4 American National Standards Institute (ANSI) Z-55.1 "Finishes for Industrial Apparatus and Equipment."
- 2.5 ASTM International (ASTM) A-197, "Specification for Cupola Malleable Iron."
- 2.6 ASTM International (ASTM) A-53M-10, "Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless."
- 2.7 ASTM International (ASTM) D-2000, "Classification System for Rubber Products in Automotive Applications."
- 2.8 ASTM International (ASTM) A-108, "Standard Specification for Steel Bar, Carbon and Alloy, Cold Finish."
- 2.9 Manufacturer's Standardization Society Standard Practice (MSS SP) 76, "Malleable Iron Threaded Pipe Unions 150, 250 and 300 Lbs."



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2. APPLICABLE DOCUMENTS (Cont'd)

2.10 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 that 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.

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 technical product information that a manufacturer must submit to Southwest to determine if the product is suitable for use by Southwest, unless specifically stated otherwise.

3.2 The term "CWP" will be equivalent to "WOG" and will mean "cold working pressure." The CWP for unions will be the working pressure rating for the temperature range specified in Paragraph 5.2 of this specification.



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4. MATERIALS AND MANUFACTURE

- 4.1 Malleable iron unions will be manufactured in accordance with ANSI B-16.39 or MSS SP76.
- 4.2 The unions shall be manufactured from malleable iron produced in accordance with ASTM A-197, 12L14 cold rolled steel per ASTM A-108 or forged steel per AISI 1026. The connecting nut shall be manufactured from either malleable iron or steel. If the union is manufactured from steel, the nut shall also be manufactured from steel. The edges of the nut may be chamfered.
- 4.3 The tail and swivel (pipe ends) shall provide a suitable wrench grip. This may be accomplished by providing paralleling surfaces or a round surface with lugs.
- 4.4 For regular unions, the seating surface of the tail shall consist of a brass or bronze ring forced into the union so as to form an integral part. The seating surface of the swivel may be of brass, malleable iron or mild steel. If of brass or bronze, it shall be forced into the union so as to form an integral part.
- 4.5 The pipe ends of the swivel and threaded piece may be octagonal, decagonal or cylindrical. The nut may be hexagonal or octagonal.
- 4.6 The insulating unions shall meet the same requirements as the regular unions, except that the swivel piece shall be electrically insulated from the nut and threaded piece.
- 4.7 The sealing gasket, for insulating unions, between the swivel piece and the threaded piece shall be an O-ring that does not allow leakage during testing and operating conditions.
- 4.8 The insulator for insulating unions shall be integrally molded on the swivel piece. The insulation shall cover the flat joint face and beyond the outside edge of the nut in an unbroken surface. The minimum insulation thickness shall be at least .20-inch. Dielectric strength at 0.2 percent moisture shall be a minimum of 400V per .001-inch of insulating material.
- 4.9 Threads will be tapered pipe threads in accordance with ANSI B-1.20.1.



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4. MATERIALS AND MANUFACTURE (Cont'd)

- 4.10 The mutual contact surfaces of the swivel for regular unions and nuts subjected to pressure in tightening shall be finished smooth and shall be at right angles to the center line of the threads. The seating surfaces between the tail swivel shall be accurately ground to a polished surface with no scoring.
- 4.11 All parts of the union shall be finished and assembled. They shall be uniform in thickness and strength and free from blow holes, seams, porosity or other injurious defects. They shall be cleaned of sand, scale and all irregularities.
- 4.12 The tail and swivel of the union shall, when assembled, be concentric with the centerline of the threads.
- 4.13 Unless otherwise specified, all threaded unions 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-12.2 and B-12.3 or a pre-approved equivalent. The coating process will not subject insulating unions to a temperature that will damage the insulating material.
- 4.14 When specified, galvanizing shall be in accordance with ASTM A-53.

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4. MATERIALS AND MANUFACTURE (Cont'd)

APPROVED PAINT SYSTEMS				
SYSTEM NUMBER	SURFACE PREPARATION	PRIMER COAT	INTERMEDIATE COAT	FINISH COAT
1	Solvent Cleaning (SSPC-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-12.2



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4. MATERIALS AND MANUFACTURE (Cont'd)

APPROVED PAINT SYSTEMS MANUFACTURER'S PART NUMBERS				
SYSTEM NUMBER	CARBOLINE	SHERWIN WILLIAMS	RUST-OLEUM	KRYLON
1 ¹	801	B58 T 104	9100 Series	
	834	B65 W 300 Ser.	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 Ser.		

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-12.3



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5. PERFORMANCE REQUIREMENTS

- 5.1 The dielectric strength of the insulating union shall be at least 2,500 volts.
- 5.2 The temperature range for all unions will be at least -20°F to 150°F.
- 5.3 Regular unions will meet the following test requirements:
 - 5.3.1 The unions shall conform to the minimum tensile strength requirements shown in Table B-12.4. Tests shall be conducted by screwing a threaded bar into each end of the union. The union nut shall be tightened solidly. The assembly shall then be pulled in a testing machine operating at a uniform crosshead speed rate of not more than 1/3-inch per minute.

TENSILE STRENGTH OF UNION			
Pipe Size (Inches)	Breaking Load – Pounds		
	CLASS 150	CLASS 250	CLASS 300
1/8	1,640	2,560	4,000
1/4	2,340	3,800	6,000
3/8	4,030	5,300	8,000
1/2	5,770	7,700	10,000
3/4	8,060	10,600	14,000
1	11,780	15,500	18,000
1-1/4	16,190	21,300	23,000
1-1/2	19,690	25,800	28,000
2	22,500	30,000	40,000
2-1/2	27,250	35,000	55,000

TABLE B-12.4



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5. PERFORMANCE REQUIREMENTS (Cont'd)

5.3.2 Each assembled union shall be given a leak test by the manufacturer and found free from leaks when subjected to the following air or gas pressures:

- Class 150 – 100 psig
- Class 250 – 100 psig
- Class 300 – 150 psig

5.3.3 Each assembled union shall be capable of withstanding a hydrostatic test of twice its CWP rating without showing any evidence of leakage.

5.4 When an insulating union is assembled to make-up torque listed in Table B-12.5, it shall be capable of meeting the performance requirements of paragraphs 5.4.1 through 5.4.4.

NOMINAL SIZE (Inches)	MAKE-UP TORQUE (foot pounds)
1/2	50
3/4	75
1	100
1 1/4	125
1 1/2	150
2	200

TABLE B-12.5

5.4.1 There will be no less than 100,000 ohms of electrical resistance between the swivel piece and the thread piece when dry and not less than 1,000 ohms after being immersed in tap water for 24 hours and then removed and wiped dry.

5.4.2 The union shall not leak when subjected to an air test pressure of 100 psig after being immersed in 106°F hot water for 15 minutes and then in ice cold water (approximately 34°F) for 15 minutes. This union must pass this air test three (3) times.



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5. PERFORMANCE REQUIREMENTS (Cont'd)

- 5.4.3 Each assembled union shall be capable of withstanding a hydrostatic test of twice its CWP rating without showing any evidence of leakage.
- 5.4.4 A union assembled with a 14-inch or longer nipple and a bending force applied and subjected to air pressure of 100 psig, shall withstand a bending moment indicated in Table B-12.6 without developing an air leak or reducing the electrical resistance.

NOMINAL SIZE (Inches)	BENDING MOMENT (foot pounds)
1/2	100
3/4	150
1	200
1 1/4	250
1 1/2	300
2	400

TABLE B-12.6

6. DIMENSIONS AND TOLERANCES

- 6.1 Each regular union will meet the dimensional specifications and tolerances provided in the manufacturers Product Information Package (PIP) and will be in accordance with Appendix A of this specification.
- 6.2 Each insulated union will meet the specifications and tolerances provided in the manufacturer's PIP.



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7. INSPECTION

- 7.1 Successful review of the 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 manufacture and testing of any and all materials, products or systems referenced in this specification that are 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 material specification 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 furnished to SWG. This certification will state that union samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that all requirements have been met. When specified in the purchase order or contract, a report of results will be provided.

Upon the request of Southwest, the certification of an independent third party indicating conformance to this 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

Each union will be marked with a minimum of the following:

- Manufacturer's name or trademark.
- Class designation for Class 250 and 300 regular unions, Class 150 unions are not required to be marked.
- Pressure rating for 600 CWP insulating unions, Class 150 and 175 CWP are not required to be marked.

11. PACKAGING AND PACKAGE MARKING

Each package will be marked with the following:

- Manufacturer's name
- Manufacturer's part number
- Class description of pressure rating
- Size
- Lot number or equivalent



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12. STOCK CLASS DESCRIPTION

UNION, MALLEABLE IRON, ____ INCH, CLASS ____ (150, 250 OR 300), ____ (300, 400, 600) PSIG BRASS SEAT, THREADED, COATED.

UNION, INSULATING, MALLEABLE IRON, ____ INCH, ____ (175, 300 OR 600), CWP, THREADED, COATED.



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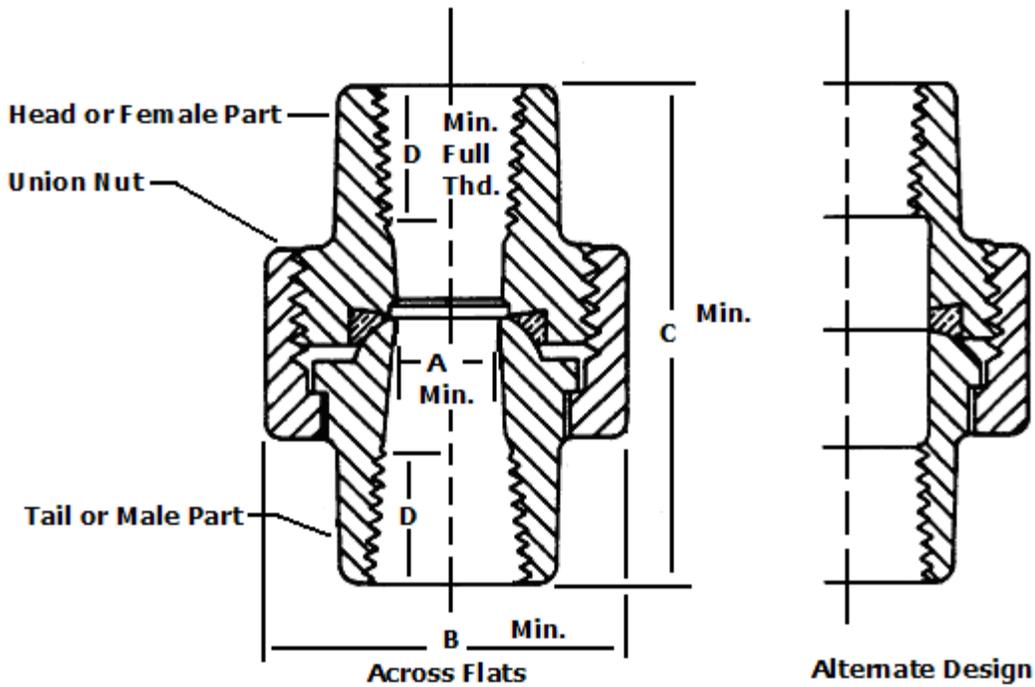
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APPENDIX A

Class 150 Malleable Iron Unions



PIPE SIZE	A (Minimum)	B (Minimum)	C (Minimum)	D (Minimum)
1/8	.21	.93	1.26	.30
1/4	.36	1.10	1.44	.32
3/8	.52	1.26	1.61	.36
1/2	.61	1.45	1.72	.43
3/4	.80	1.71	1.94	.50
1	1.00	2.07	2.06	.58
1 1/4	1.31	2.50	2.26	.67
1 1/2	1.55	2.82	2.41	.70
2	2.03	3.41	2.75	.75
2 1/2	2.38	4.12	3.22	.92

TABLE B-12.7



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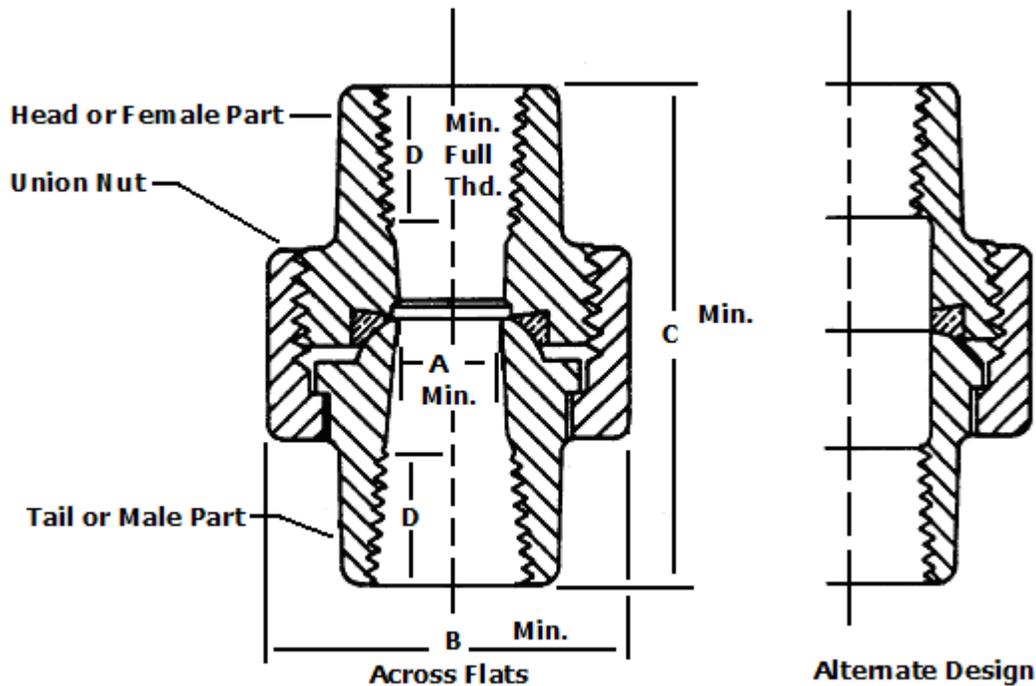
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APPENDIX A

(Cont'd)

Class 250 Malleable Iron Unions



PIPE SIZE	A (Minimum)	B (Minimum)	C (Minimum)	D (Minimum)
1/8	.21	.93	1.26	.30
1/4	.30	1.11	1.55	.43
3/8	.42	1.26	1.71	.47
1/2	.54	1.45	1.81	.57
3/4	.74	1.71	2.07	.64
1	.95	2.07	2.31	.75
1 1/4	1.27	2.57	2.62	.84
1 1/2	1.50	2.89	2.78	.87
2	1.93	3.48	3.13	1.00
2 1/2	2.32	4.15	3.52	1.17
3	2.90	4.96	3.84	1.23
4	3.82	6.47	4.39	1.33

TABLE B-12.8



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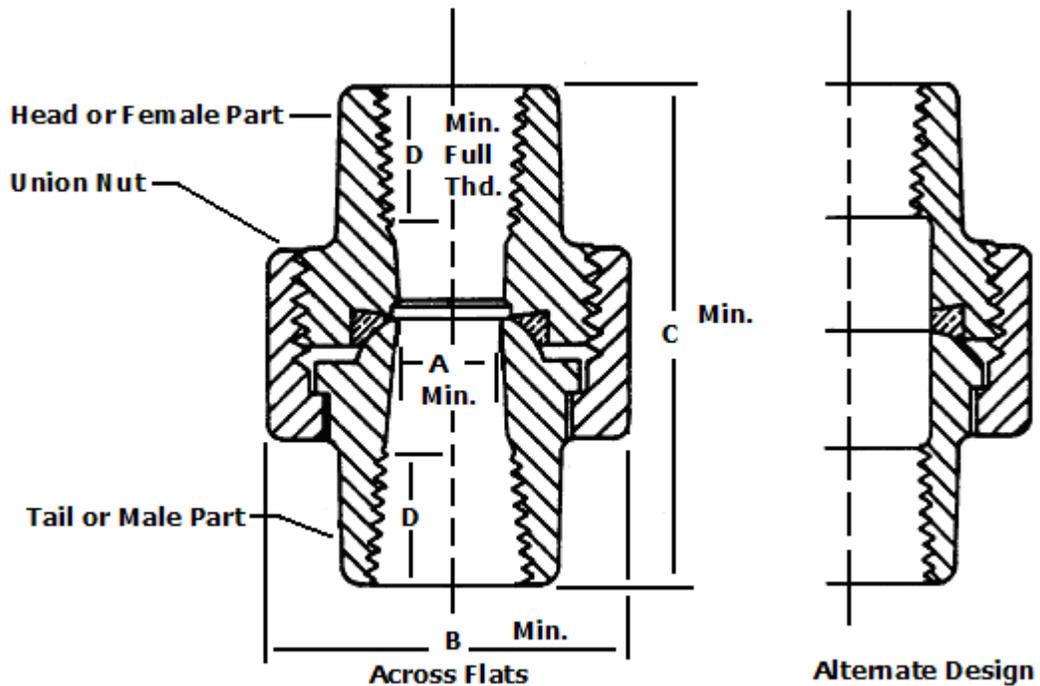
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APPENDIX A

(Cont'd)

Class 300 Malleable Iron Unions



PIPE SIZE	A (Minimum)	B (Minimum)	C (Minimum)	D (Minimum)
1/8	.21	.93	1.26	.30
1/4	.30	1.33	1.55	.43
3/8	.42	1.50	1.71	.47
1/2	.54	1.76	1.81	.57
3/4	.74	2.15	2.12	.64
1	.95	2.48	2.31	.75
1 1/4	1.27	3.02	2.66	.84
1 1/2	1.50	3.28	2.85	.87
2	1.93	3.96	3.23	1.00
2 1/2	2.32	4.72	3.33	1.17
3	2.90	5.37	4.09	1.23
4	3.82	7.00	4.47	1.33

TABLE B-12.9