SOUTHWEST GAS CORPORATION
ENGINEERING STAFF
MATERIAL SPECIFICATION

Section No:	MS E-13
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SERVICE FITTINGS
Riser, Anodeless

1. SCOPE

This specification covers risers used for connecting 1/2" CTS, 1" CTS, 1-1/4" IPS, 2" IPS and 4" IPS polyethylene (PE) plastic pipe to meter set assemblies and riser identifiers.

The riser does not require cathodic protection because no gas-carrying steel component is to be installed below ground level. All anodeless risers covered by this specification must be tested in accordance with approved SWG procedures.

2. APPLICABLE DOCUMENTS

2.1 American National Standards Institute (ANSI) B-1.20.1 "Pipe Threads, General Purpose (Inch)."

2.2 American Petroleum Institute (API) Standard 1104, "Welding Pipelines and Related Facilities."

2.3 ASTM International (ASTM) A-53, "Standard Specification for Welded and Seamless Steel Pipe."

2.4 ASTM International (ASTM) A-513, "Standard Specification for Electric Resistance Welded Carbon and Alloy Steel Mechanical Tubing."

2.5 ASTM International (ASTM) A-106/106M, "Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service".

2.6 ASTM International (ASTM) D-2513, "Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing and Fittings."

2.7 ASTM International (ASTM) D-638, "Testing Method for Tensile Properties of Plastics."

2.8 ASTM International (ASTM) G-6, "Standard Test Method for Abrasion Resistance of Pipeline Coatings."

2.9 Southwest Gas Corporation Material Specification (MS) A-7, "High Density Polyethylene Pipe and Tubing."

2.10 Southwest Gas Corporation Material Specification (MS) B-10, "Fittings, Forged Steel, Threaded."

2. APPLICABLE DOCUMENTS (Cont'd)

2.11 ASTM International (ASTM) F1973 "Standard for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide 11 (PA11) and Polyamide 12 (PA12) Fuel Gas Distribution Systems".

2.12 Southwest Gas Corporation Material Specification (MS) D-2, "Stopcocks, Soft Seat, Permanently Lubricated."

2.13 Southwest Gas Corporation Material Specification (MS) H-6, "Pipe Thread Compound."

2.14 Title 49, 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 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. 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.

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 "approve," "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 "Holidays," as defined by ASTM G-6, will mean small faults or pinholes which permit current drainage through protective coating on steel pipe.

3. TERMINOLOGY (Cont'd)

3.1.4 The terms "pipe" or "tubing" will mean "pipe and tubing" unless specifically stated otherwise.

3.1.5 "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.

4. MATERIALS AND MANUFACTURING

4.1 Polyethylene Tubing will meet the following requirements:

- HDPE tubing will be Phillips Driscopipe 8100, or Performance Pipe 8300, or 8400 pipe. All pipe will be extruded from resin HP516 as ordered by Southwest Gas, which must conform to Southwest Gas Material Specification MS A-7, Section 4, Materials and Manufacturing.
- PE tubing will be manufactured in sizes listed in Section 6, Table E-13.1.
- The open end of the PE tubing will be provided with a plastic dust cap.

4.2 Steel Casing will meet the following requirements:

- If coiled PE tubing is used, the steel casing will be bent in the direction of the coil to prevent kinking.
- All steel pipe or tubing used for PE casing will conform to ASTM A-53 (Type E or S), ASTM A-513 (Type I) or ASTM A-519. Pipe may be seamless or electric-resistance welded (ERW).
- ERW pipe internal flash will be controlled to a maximum 0.010" to prevent damage to PE pipe.
- Casings with nominal diameters 2 inches and less may be bent to vertical and horizontal dimensions provided that neither the case coating nor the case is damaged. The casing will have a bend radius no less than that shown on Table E-13.4 in Appendix A of this specification or is specified by the PE manufacturer, whichever is greater.

4. MATERIALS AND MANUFACTURING (Cont'd)

4.2 Steel Casing will meet the following requirements (Cont'd):

- Steel casings larger than 2 inches that are bent or casing assemblies with ells, joints, etc. may be used with written approval from SWG's Engineering Staff.

4.3 Plastic to steel transitions will be manufactured in accordance with DOT 192.281(e) and ASTM F1973, Category 1. This joint provides a seal and resistance to forces on the pipe-end which will cause permanent deformation of the pipe or tubing. Elastomers used to provide the seal must be compatible with natural gas and approved by SWG.

4.4 The PE-to-steel transition will be no more than 12 inches below the top threads of the riser unless otherwise specified by SWG Engineering Staff.

4.5 The top of the bypass will be a minimum of 6 inches below the top threads of the riser for riser sizes up to 1-1/4 inches. For riser sizes 1-1/2 inches through 2 inches, only 3 inches is required from the top of the bypass to the top threads of the riser.

4.6 Fusion joints used in the assembly of a riser to this specification will be in accordance with DOT 192.283.

4.7 Steel pipe used for outlets or bypasses which will serve as a gas carrier will be in accordance with the following:

- Made from ASTM A-53 or A106/106M (Type E or S), Grade B, Schedule 40 or 80 material.
- Must meet tolerances outlined in Paragraph 6.2.
- Nominal pipe threads will conform with ANSI B-1.20.1
- Pipe threads will be free of burrs and other defects.
- Bypass will be welded in accordance with API Standard 1104 for welding pipelines.

4. MATERIALS AND MANUFACTURING (Cont'd)

4.8 A water seal/secondary water seal will be made where the PE tubing enters the casing. This seal is buried and will accomplish the following:

- Prevent contaminants such as water and soil from entering the riser casing.
- Eliminate any shear pressure between the PE tube and steel casing.

4.9 The casing will be coated with a high-quality, non-TMA gray epoxy that is electrostatically applied (fusion bonded) and is a minimum of 8 mils thick. The coating will be free of voids, holidays or other defects. Substrate will be clean and free of foreign material such as oil and moisture to assure good adhesion of epoxy.

The remaining upper portion of the riser that is not coated with the above-mentioned coating will be primered and painted with the appropriate approved paint. Paint will also be applied to all exposed threads.

4.10 Pipe will be free of contaminants internally and externally and show good workmanship.

4.11 Measured from the casing inlet, the PE tube or pigtail will extend a minimum of 6 inches for 1/2" CTS and 12 inches for 1" CTS and greater.

4.12 A protective sleeve for the isolation of the riser casing from construction materials such as concrete will be installed on the vertical part of the riser; between the sweep and the transition. This sleeve may be made from a polyethylene or polypropylene based thermoplastic and will have adequate wall thickness to prevent breakage that may occur during shipping or installation. The sleeves inside diameter will be a minimum of 1/4" larger than the riser casing's outside diameter. The protective sleeve will be of sufficient length to prevent its removal from the sweep end of the riser or 10 inches, whichever is longer. The stopcock or bypass on the riser shall prevent the unintentional removal of the sleeve from the top of the riser.

NOTE: Paragraph 4.12 does not apply for 2" risers.

4. MATERIALS AND MANUFACTURING (Cont'd)

4.13 When specified on the purchase order, stopcocks that meet SWG's MS D-2 specification will be installed on the outlet and bypass (if so equipped) using pipe thread compound that complies with SWG's MS H-6. The stem of this valve will point the same direction as the inlet of the riser. The open end of each stopcock will be plugged with a steel plug which meets the requirements of SWG Material Specification MS B-10.

4.14 Upon agreement between supplier and SWG, necessary stabilizing hardware may be specified, which may include, but not limited to stakes, angle iron or straps.

4.15 Risers without bypasses shall be manufactured with a riser bend direction indicator. The bend indicator shall be welded to the nipple approximately 1 inch above the casing and will point the same direction as the inlet of the riser. Design of the bend indicator must be approved by SWG Engineering Staff.

4.16 The gas-carrying polyethylene pipe shall be centered within the sleeving utilizing an acceptable method such as bushings or spacers.

4.17 Riser identifiers will meet the following requirements:

- Square-shaped riser identifier will be designed to fit 3/4" through 2" risers.
- L-shaped riser identifiers will be designed to fit 3" and larger risers.
- All riser identifiers will be made of aluminum material and will be in accordance with Appendix D of this specification.

5. PERFORMANCE REQUIREMENTS

5.1 Risers will be rated at an operating temperature range from -20°F (-28.89°C) to 140°F (60°C) at 60 psig. All risers must be capable of operating at 60 psig and 140°F (60°C) simultaneously.

5.2 Risers shall meet the requirements of ASTM F1973.

5.3 The riser will be able to sustain 100 psig for a minimum 24-hour period and 60 psig indefinitely without leaking while in operating temperature parameters.

5.4 The coating will pass a jeep test approved by SWG.

6. DIMENSIONS AND TOLERANCE

6.1 The polyethylene tubing (PE 4710) will have the following dimensions:

Nominal Pipe Size (Inches)	OD (Inches)		Wall Thickness (Inches)		OOR Range (Inches) D2513	Nominal SDR	Reference
	Average	Tolerance	Minimum	Tolerance			
1/2 CTS	0.626	±0.002	0.091	+0.006			PPCo
1 CTS	1.126	±0.003	0.103	+0.007			PPCo
1-1/4 IPS	1.660	±0.005	0.151 0.178	+0.018 +0.021	0.024	11 9.33	D2513
2 IPS	2.375	±0.006	0.216 0.255	+0.026 +0.031	0.024	11 9.33	D2513
NOTE: OOR is expressed as a range (e.g., ±0.012 as a range would be 0.024). This value is the difference between the major and minor measured diameter.							

TABLE E-13.1

6. DIMENSIONS AND TOLERANCE (Cont'd)

6.2 The pipe and tubing will have the following properties:

Requirement	Value	Reference
Eccentricity (Max.)	12%	D2513
Ovality (Max.) (</=3")	5%	D2513
Toe-In (Max.)	1.5%	D2513
Quick Burst HS (Min. psi)	2,900	PPCo
Ring Tensile HS (Min. psi)	2,520	D2513
Carbon Black (Min. %)	2.0	D3350
Carbon Black (Max. %)	3.5	PPCo
Melt Index (Min. – Max.)	0.07 – 0.16	PPCo
Density (g/cm^3)	0.952 – 0.965	PPCo
Resin	H516	PPCo

TABLE E-13.2

6.3 Steel outlets and bypasses will have the following dimensions:

Nominal Diameter (In.)	Outside Diameter (Inches)	Schedule	Wall Thickness		Thread NPT
			Nominal (Inches)	Minimum (Inches)	
3/4	1.050	40 80	0.113 0.154	0.099 0.135	
1	1.315	40 80	0.133 0.179	0.116 0.157	NPT
1-1/4	1.660	40 80	0.140 0.191	0.122 0.167	NPT
2	2.375	40 80	0.154 0.218	0.135 0.191	NPT

TABLE E-13.3

NOTE: For a list of risers used by SWG, see Table E-13.4 in Appendix A.

7. INSPECTION

7.1 Successful review of the Product Information Package (PIP) as well as any future reference by Southwest 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 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 that fails to conform to this specification. Any such rejection may take place at the manufacture facility; supplier's warehouse or any subsequent delivery location, before or after SWG assumes possession. Notice of 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 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 shall 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 the 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.

9. SAFETY DATA SHEETS

In accordance with law, the Seller will supply a Safety Data Sheet 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 Risers will be marked with the manufacturers name, address, serial number and pipe schedule. The riser will have a red stripe marked “DO NOT BURY” or equivalent 12 inches below the top threads of the riser unless otherwise specified by SWG. This red stripe must be below the transition. All risers for SWG will be marked for use in elevated temperatures in accordance with ASTM D-2513 (i.e., CE).

10.2 All polyethylene pipe extensions (pups) must have the pipe manufactured date visibly indicated on the pipe by print line, label or another acceptable method that is clearly and completely readable.

11. PACKAGING AND PACKAGE MARKING

Risers will be plugged to prevent the contamination of the pipe. Threads will have a protective cap to prevent them from damage in shipping. Risers will be securely packaged in a manner that protects the coating and threads from damage that may occur from shifting during transit. Packages will be marked with manufacturer’s name, address, part number, purchase order number and riser size.

12. STOCK CLASSIFICATION DESCRIPTION

RISER, ANODELESS; _____INCH CTS X _____ WT, (MANUFACTURE, i.e., PHILLIPS M8100), PE TUBING INLET; _____INCH IPS SCH _____ CASING; _____INCH VERT X _____INCH HOR; _____INCH NPT, SCH _____ OUTLET WITH APPROVED _____INCH VALVE; _____INCH IPS SCH _____ BYPASS WITH VALVE (OPTIONAL)

RISER, ANODELESS; _____INCH IPS X SDR _____, _____ (MANUFACTURE, i.e., PHILLIPS M8100) PE PIPE INLET, _____INCH IPS SCH _____ CASING; INCH VERT X _____INCH HOR.; _____INCH NPT, SCH _____ OUTLET WITH APPROVED _____INCH VALVE; _____INCH IPS SCH _____ BYPASS WITH ___INCH VALVE (OPTIONAL)

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SERVICE FITTINGS
Riser, Anodeless

APPENDIX A

PE 3408 INLET 1		STEEL OUTLET 2		CASING 3		BYPASS 4		VALVE 5	DIMENSIONS (Tolerances in Parentheses Where Applicable)					
									A	B	C	D	E	F
CTS/ IPS	WT/ SDR	IPS	SCH	OD	WT	IPS	SCH		VERT	HOR (∀3")	PIG TAIL (∀3")	TOP/ TRANS (max)	TOP/ BYPASS (min)	BYPASS (+1")
1/2	0.090	3/4	40	1.00	0.075	C	C	3/4	36	26	8	12	5	C
1/2	0.090	3/4	80	1.00	0.075	C	C	3/4	36	26	8	12	5	C
1	0.101	3/4	40	1.25/ 1.50	0.075	C	C	3/4	36	30	8	12	5	C
1	0.101	3/4	80	1.25/ 1.50	0.075	C	C	3/4	36	30	8	12	5	C
1/2	0.090	3/4	40	1.00	0.075	C	C	3/4	30	22	8	12	5	C
1/2	0.090	3/4	80	1.00	0.075	C	C	3/4	30	22	8	12	5	C
1	0.101	3/4	40	1.25/ 1.50	0.075	C	C	3/4	30	27	8	12	5	C
1	0.101	3/4	80	1.25/ 1.50	0.075	C	C	3/4	30	27	8	12	5	C
1	0.101	1	40	1.25/ 1.50	0.075	3/4	40	3/4, 1	30	27	8	12	5	2
1	0.101	3/4	40	1.25/ 1.50	0.075	3/4	40	3/4, 3/4	36	30	8	12	5	2
1-1/4	11	1-1/4	40	2.00/ 2.125	0.095	3/4	40	1-1/4, 3/4	36	29	8	12	5	2.5
2	11	2	40	3.50	0.216	1	40	2, 1	35	ωω	8	12	3	3.5

NOTES:
All dimensions are in inches
ω = Minimum Wall Thickness
ωω = Fabricated Riser

TABLE E-13.4

APPENDIX A
(Cont'd)

CASING SIZE OD	MINIMUM BEND RADIUS
1	10
1.25	12
1.50	12
2	18
2.125	18
NOTE: All dimensions are in inches.	

TABLE E-13.5

APPENDIX A
(Cont'd)

2" RISER ONLY

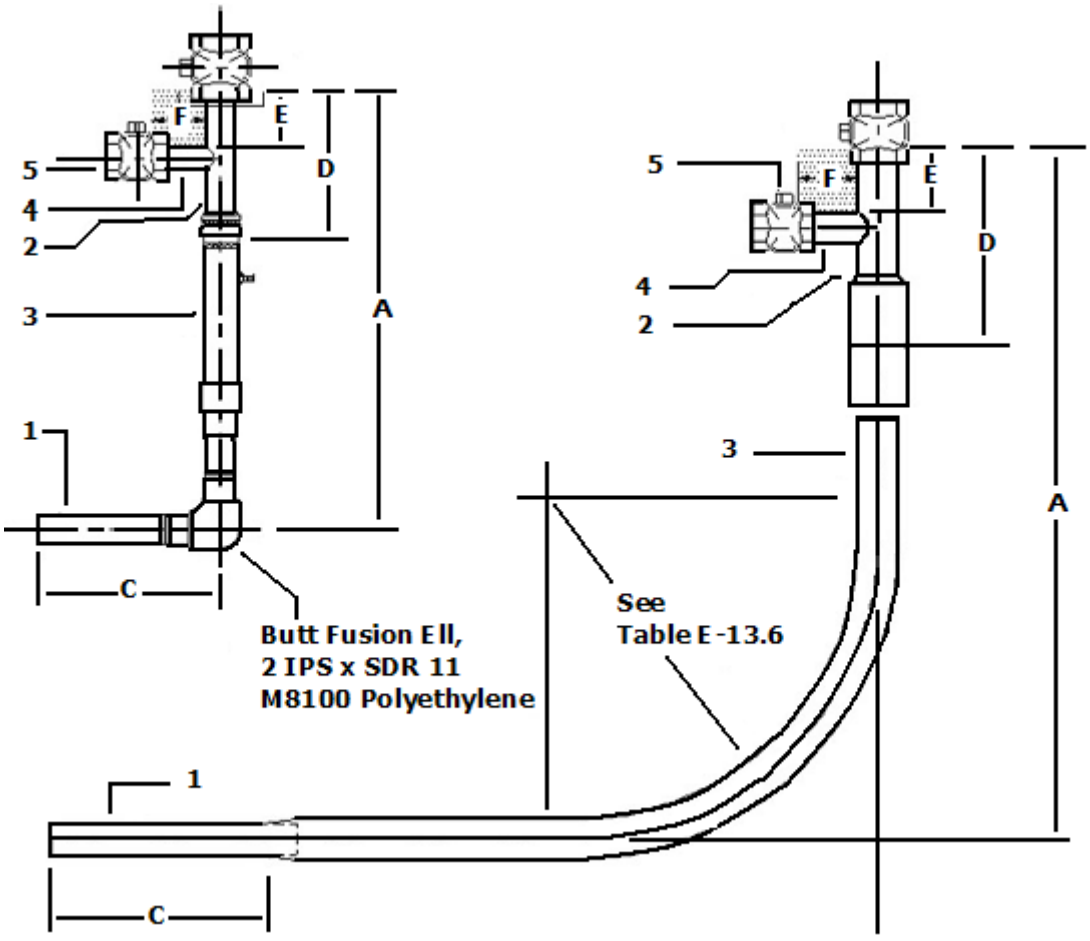
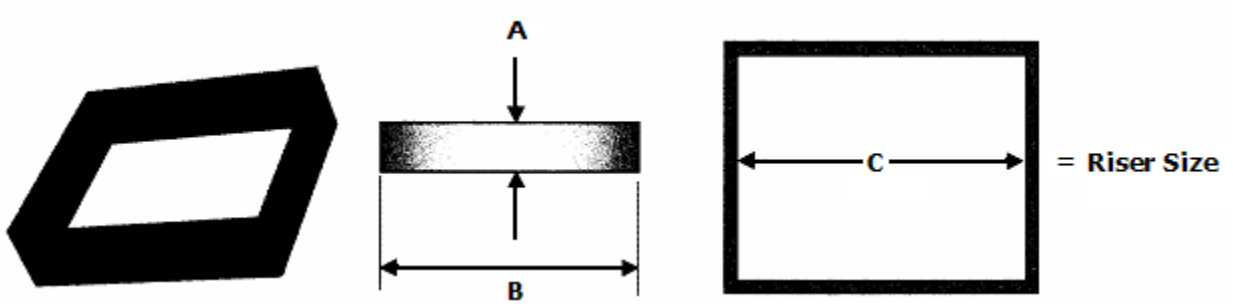


FIGURE E-13.1

APPENDIX B

RISER IDENTIFIER

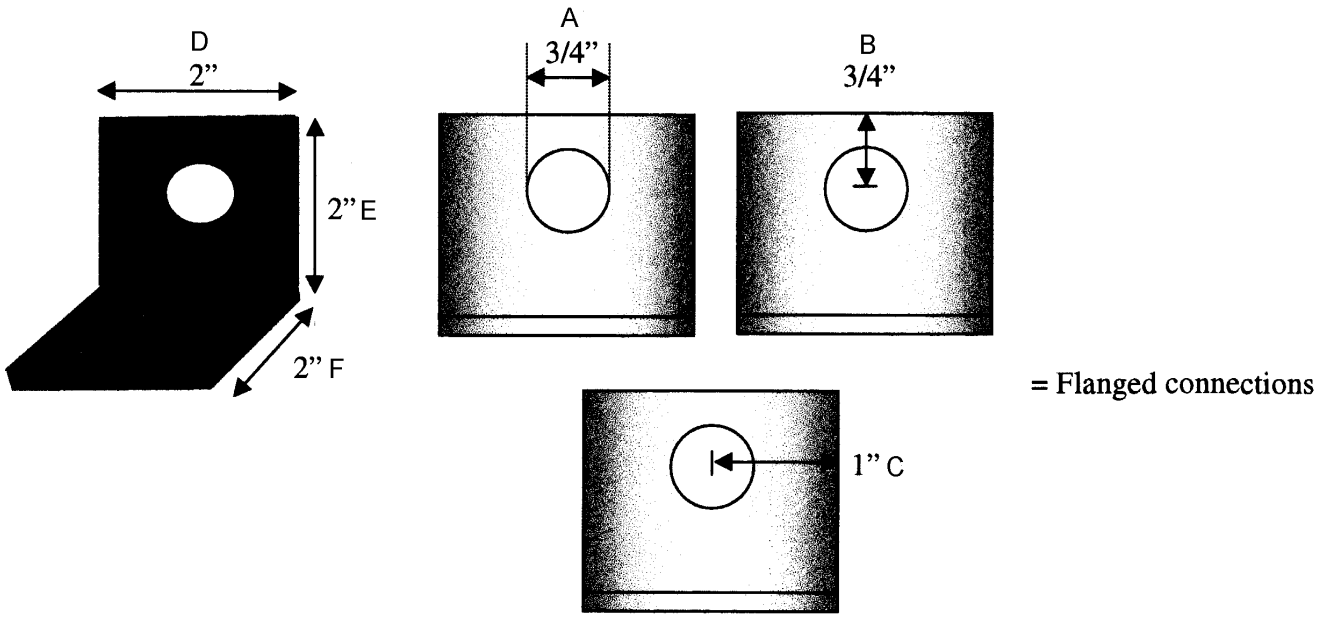


SQUARE RISER IDENTIFIER			
SIZE (Inches)	A In.	B In.	C In.
3/4	1.000	1.750	1.500
1	1.000	1.750	1.500
1-1/4	1.000	2.000	1.750
2	1.000	3.000	2.750

TABLE E-13.6

APPENDIX B
(Continued)

RISER IDENTIFIER



L-SHAPED RISER IDENTIFIER					
A	**B**	**C**	**D**	**E**	**F**
In.	**In.**	**In.**	**In.**	**In.**	**In.**
0.750	0.750	1.000	2.000	2.000	2.000

TABLE E-13.7