SOUTHWEST GAS CORPORATION
ENGINEERING STAFF
MATERIAL SPECIFICATION

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PIPE FITTINGS
High Density Polyethylene Butt Fusion Fittings

1. SCOPE

This specification covers high density polyethylene butt fusion fittings in nominal diameters of 1-1/4" IPS, 2" IPS, 3" IPS, 4" IPS, 6" IPS and 8" IPS intended for use in natural gas distribution systems. Fittings included in this standard are caps, 90°ells, 45°ells, reducers and tees.

2. APPLICABLE DOCUMENTS

2.1 ASTM International (ASTM) D2513, "Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing and Fittings"

2.2 ASTM International (ASTM) D3261, "Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing"

2.3 ASTM International (ASTM) D3261, "Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene Plastic Pipe and Tubing"

2.4 ASTM International (ASTM) D3350, "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials"

2.5 ASTM International (ASTM) F2897, "Standard Specification for Tracking and Traceability Encoding System of Natural Gas Distribution Components (Pipe, Tubing, Fittings, Valves, and Appurtenances)"

2.6 Plastic Pipe Institute (PPI) TR-4, "PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe"

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 above documents 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 "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. TERMINOLOGY (Cont'd)

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.

4. MATERIALS AND MANUFACTURING

4.1 Unless otherwise indicated, this specification covers the following fitting sizes:

- Caps — 8" IPS, 6" IPS, 4" IPS, 3" IPS, 2" IPS and 1-1/4" IPS
- 45 °Ells — 8" IPS, 6" IPS, 4" IPS and 3" IPS
- 90 °Ells — 8" IPS, 6" IPS, 4" IPS, 3" IPS, 2" IPS and 1-1/4" IPS
- Reducers — 8" IPS x 6" IPS, 6" IPS x 4" IPS, 4" IPS x 3" IPS, 4" IPS x 2" IPS, 3" IPS x 2" IPS and 2" IPS x 1-1/4" IPS
- Tees — 8" IPS, 6" IPS, 4" IPS, 3" IPS, 2" IPS and 1-1/4" IPS

4.2 The resins from which the high-density polyethylene fittings are molded will be PE4710, be in accordance with ASTM D3261, and have a current listing published by the Plastics Pipe Institute (PPI) TR-4. The manufacturer will supply a PPI listing number for each resin used in the manufacture of the fittings for Southwest Gas.

4.3 All fittings will be made from virgin material.

4.4 The fittings will be uniform in physical and chemical properties, and free of cracks, holes, foreign inclusions, areas of unpigmented polymer ("windows") or other injurious defects.

4.5 The fittings will be clean and internally free of paint, dirt, sand and other debris.

4.6 The fittings will contain suitable ultraviolet inhibitors so that their physical properties will not be adversely affected by exposure to natural ultraviolet light in locations throughout Southwest's service area in accordance with ASTM D3261.

4. MATERIALS AND MANUFACTURING (Cont'd)

4.7 The fittings will contain suitable antioxidants, which protect against changes in molecular weight and enables heat fusion joining of the system components.

4.8 The fittings will be joinable to and compatible with the Seller's other high-density system components by heat fusion using standard Southwest Gas joining procedures and tools, without affecting the strength or the pressure rating of the assembly.

4.6 The fittings will be joinable to and compatible with all the various types and grades of high-density PPI No. PE3406 and PE3408 (manufactured by Plexco and Phillips) and PE4710 that are being purchased and/or exists in Southwest Gas' distribution network. Southwest Gas will use its standard heat fusion joining procedures and tools. Each manufacturer must provide Southwest with procedures for fusing these materials to their products upon request.

5. PERFORMANCE REQUIREMENTS

5.1 The fittings will be designed for use in gas distribution systems in all class locations, at pressures up to 100 psig and at temperatures up to 140°F (60°C), either underground or in casing installations. **All fittings designed must be capable of operating at 60 psig and 140°F (60°C) simultaneously.** All product features must be acceptable to SWG.

5.2 The fittings will be designed so that no harmful or hazardous substances will be released into the gas and/or ground.

5.3 The fittings will be designed so that oils and other agents and debris commonly found in natural gas pipelines will not adversely affect the product serviceability.

5. PERFORMANCE REQUIREMENTS (Cont'd)

5.4 All polyethylene butt fusion fittings considered for qualification by Southwest Gas will be tested using the requirements outlined in ASTM D2513. Tests will include minimum hydrostatic burst pressure and sustained pressure.

5.5 Additional tests or the use of expanded testing environments may be utilized by Southwest Gas as part of the material qualification process.

5.6 Materials will be accepted or rejected using the criteria stated in ASTM D2513. Each of the above referenced tests will be conducted on six specimens of each type and size of fitting. Failure on any test of two or more specimens for each classification will constitute a failure to meet this material specification for that fitting. Failure of a single specimen on any test will result in a retest of the classification. A failure in the retest group will result in the failure of the material per this specification.

5.7 Material qualification will be retained if the material passes periodic acceptance testing. Any revisions to design or processing by the manufacturer after the initial testing requires immediate notification to Southwest Gas and retesting of the product to assure this material specification is met.

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6. DIMENSIONS AND TOLERANCES

The fittings will be designed to join coiled as well as straight lengths of polyethylene pipe and will concur with the following dimensions:

Nominal Pipe Size IPS (Inches)	Outside Diameter Average	Outside Diameter Tolerance	Wall Thickness Minimum	Wall Thickness Tolerance	Nominal SDR
	Inches	Inches	Inches	Inches	
1-1/4	1.660	±0.012	0.151	+0.018	11
2	2.375	±0.012	0.216 0.255	+0.026 +0.031	11 9.33
3	3.500	±0.015	0.318 0.375	+0.038 +0.045	11 9.33
4	4.500	±0.015	0.409 0.482	+0.049 +0.058	11 9.33
6	6.625	±0.035	0.602	+0.072	11
8	8.625	±0.040	0.785	+0.094	11

NOTE: For a list of fitting sizes and manufacturers approved for purchase, refer to Section 13, **Approved Manufacturers.**

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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 the requirements of this specification.

7.2 SWG retains the option to inspect at the manufacture and testing of all materials and products referenced in this specification that are sold to Southwest Gas.

7.3 SWG will make appropriate inspections and tests of all materials, products or systems supplied to this specification. Southwest 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 Southwest 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 high-density polyethylene butt fusion fittings, covered under this document, for sale to Southwest must be approved by Southwest's Engineering Staff. **Failure to obtain Southwest'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.

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

Marking on plastic fittings will comply with the marking requirements of ASTM D2513. The marking method will provide permanent identification of the fitting, enabling access to quality and manufacturing records at any time and will include manufacturer's name or trademark (or both), size, the ASTM standard designation "D2513," material classification, serial number, manufacture date and temperature rating.

The temperature rating marking will be in accordance with ASTM D2513, which consists of, at minimum, a two-letter coding (i.e., "CE"). The first code letter is to identify the high temperature rating and the second code letter is to identify the HDB rating at that high temperature rating. A third code letter may be included which signifies the melt index. The first code letter must have a minimum of a "C" rating which signifies a temperature rating of 140°F (60°C). **The second code letter pertaining to the HDB rating must be a minimum of an "E" rating which signifies an HDB rating of 1000 psig.**

11. PACKAGING & PACKAGE MARKING

11.1 Seller will adequately prepare all fittings for shipment. Seller will furnish and install necessary covers to protect the fittings from sunlight, excessive heat, photochemical smog, rain, hail, wind, dust, etc. Fittings will be adequately sealed and protected during shipment to prevent entrance of foreign matter and possible damage from rough handling during transit. Packaging will facilitate its safe handling and its reshipment between the stocking and user locations. Each fitting will be individually wrapped with transparent plastic.

11.2 Southwest Gas will store the goods indoors until they are transferred to various gas crew trucks.

11.3 Pallet and package sizes will be determined and/or approved by Southwest Gas Corporate Purchasing Department.

12. STOCK CLASSIFICATION DESCRIPTION

TEE, DOW 2490 OR MARLEX H516 MATERIAL, _____-INCH IPS BY SDR ____, HIGHDENSITY POLYETHYLENE, MOLDED BUTT FUSION FITTING.

CAP, DOW 2490 OR MARLEX H516 MATERIAL, ____-INCH IPS BY SDR ____, HIGH DENSITY POLYETHYLENE, MOLDED BUTT FUSION FITTING.

ELL, DOW 2490 OR MARLEX H516 MATERIAL, ____DEGREE, ____-INCH IPS BY SDR, HIGH DENSITY POLYETHYLENE, MOLDED BUTT FUSION FITTING.

REDUCER, DOW 2490 OR MARLEX H516 MATERIAL, CONCENTRIC, ____-INCH IPS BY ____-INCH IPS BY SDR ____, HIGH DENSITY POLYETHYLENE, MOLDED BUTT FUSION FITTING.