



**GAS DESIGN STANDARD**  
**INSTALLING AND MAINTAINING A POLYETHYLENE GAS**  
**DISTRIBUTION SYSTEM**

**A-93.1**

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**Purpose and Scope**

This Gas Design Standard provides requirements for installing and maintaining the Pacific Gas and Electric Company (Company) polyethylene (PE) gas distribution system, as required by Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.321, “Installation of plastic pipe.”

The subject areas covered include:

- General Information
- Construction Materials
- Construction Methods
- Direct Burial
- Mechanical Insertion of Polyethylene Pipe
- Repairs
- Testing
- Recordkeeping

**General Information**

1. Joining Polyethylene

- A. Only personnel qualified under Gas Design Standard D-34, “Qualifications for Joining Plastic Pipe” may make connections to plastic gas distribution facilities.

## General Information (continued)

## B. Connections within the PE system may be made with the following:

- Heat socket fusion and butt fusion (Gas Design Standard B-90, "Plastic System Socket and Butt Fusion Fittings")
- Heat saddle fusion (Gas Design Standard B-90.1, "Plastic System Saddle Fittings")
- Electrofusion (Gas Design Standard B-90.3, "Electrofusion Fittings and Tapping Tees")
- Mechanical connection (Gas Design Standard B-91, "Transition Fittings for Polyethylene Pipe" and Gas Design Standard B-91.1, "Polyethylene (PE) System Mechanical Fittings")

## C. Qualified personnel may join PE pipe and fittings using approved heat-iron or electrofusion joining procedures:

- Utility Procedure TD-4170P-31, "Heat Iron Socket Fusion for Polyethylene Pipe"
- Utility Procedure TD-4170P-32, "Heat Iron Saddle Fusion for Polyethylene Pipe (Manual)"
- Utility Procedure TD-4170P-33, "Heat Iron Saddle Fusion for Polyethylene Pipe (Mechanical Assist Tool)"
- Utility Procedure TD-4170P-34, "Heat Iron Butt Fusion for Polyethylene Pipe (Mechanical)"
- Utility Procedure TD-4170P-35, "Heat Iron Butt Fusion for Polyethylene Pipe (Hydraulic)"
- Utility Procedure TD-4170P-40, "Electrofusion for Polyethylene Pipe (Coupling)"
- Utility Procedure TD-4170P-41, "Electrofusion for Polyethylene Pipe (Saddle)"

## Or using approved mechanical fitting installation procedures:

- Utility Procedure TD-4170P-50, "Mechanical Fitting Connections for Polyethylene Pipe (Stub Outlet)"
- Utility Procedure TD-4170P-52, "Mechanical Fitting Connections for Polyethylene Pipe (Threaded Compression Transitions)"
- Utility Procedure TD-4170P-53, "Mechanical Fitting Connections for Polyethylene Pipe (Bolt-On Saddle)"

## D. Standard heat iron fusions are NOT allowed on Aldyl-A material. Use ONLY electrofusion or mechanical fittings with Aldyl-A material.

## E. Mechanical fittings are NOT allowed on molded butt fusion fitting such as 3-way tees, 90 degree elbows, 45 degree elbows, end caps, reducers, branch saddles, PE valves with molded ends, and tapping tees without pipe pups.

## F. See A-90 for preferred PE joining methods and fitting limitations.

## General Information (continued)

## 2. Transitions from PE to Steel, Copper or Cast Iron

A. Make PE-to-steel, PE-to-copper or PE-to-cast-iron transition joints using the approved transition fittings:

- Gas Design Standard B-54, "Compression Couplings"
- Gas Design Standard B-90, "Plastic System Socket and Butt Fusion Fittings"
- Gas Design Standard B-91, "Transition Fittings for Polyethylene Pipe"
- Gas Design Standard B-91.5, "Cast Iron to Polyethylene Transition Fittings."

**Note:** PE-to-copper transitions are for temporary repairs ONLY. All copper services must be replaced per Utility Standard TD-4801S, "Service Replacement Criteria."

(1) Take precautions to protect the PE pipe at the point of transition when welding the steel end.

**CAUTION**

Protect the transition joint from excessive heat.

- Never shorten the steel portion of a transition fitting. Heat from welding may damage the PE pipe if the steel is cut.
  - Protect the transition joint from excessive heat. Do NOT weld, thermite weld, or heat the body of the fitting; ONLY butt welding of the steel end is permitted.
- (2) During this welding, protect the PE part of the heat-fusion transition fitting from overheating by wrapping the midpoint of the steel part of the fitting with wet cloth to remove heat. Keep the cloth wet. After completing the weld, leave the wet cloth on the fitting until the steel pipe is cool enough to touch.
- (3) Adequately support the plastic pipe adjacent to the transition fitting. Support the exposed PE pipe with well-compacted sand or fine soil.

## 3. Riser Installation

A. Prefabricated riser installation is described in Gas Design Standard A-91, "Prefabricated Risers." The final grade level at the riser must be at or below the red burial line indicated on the riser.

(1) IF the ground slopes away from the gas service riser,

THEN straighten the 90° riser bend to match the slope. Straighten so that the vertical leg of the riser is NOT bent when installed.

## General Information (continued)

- (2) IF the ground slopes upward from the gas service riser,  
  
THEN use a short, prefabricated riser and dig a deeper trench. Taper-up the slope with service tubing. Do NOT bend the riser to match the slope.
- (3) Repair any coating damage on risers as described in Gas Design Standard E-25, "Field Wrapping With Cold-Applied Tape."
- (4) Install sun shields on all prefabricated risers and riser kits. Shields must extend from 1" below the top of the riser or below the bypass to ground level or below.
- (5) Do NOT paint a sun shield.
- (6) When installing prefabricated risers, use a locating wire (see Gas Design Standard A-90.2, "Locating Wire Installation for Plastic Mains and Services").

## 4. Thermal Expansion

- A. When installing PE pipe, ensure that all plastic lines are slack before completing final ties to allow for thermal expansion and contraction.

## 5. Marking New Service Installations

- A. All new or replaced services need to have the curb (or street) marked indicating the location of the new or replaced service. Approved markings include a yellow slash mark on the curb or other as noted in Utility Procedure TD-5811P-104, "Proper Markings." This marking provides identification/location of the gas service pending the update of the service installation by mapping.
  - IF the local municipalities or agencies have requirements that restrict marking the services,  
  
THEN note the restriction on the GSR, per TD-9500P-14, "Gas Service Record."

**Construction Materials**

## 1. Pipe

- A. Check the production date on the pipe:
  - (1) Yellow medium density polyethylene (MDPE) pipe more than 3 years old must be scrapped.

## Construction Materials (continued)

(2) Pipe and tubing that is shipped directly from the manufacturer to the job site must NOT be older than 6 months, as outlined in the following:

- Engineering Material Specification (EMS) 2502, "Specifications for Furnishing and Delivery of Polyethylene Plastic Tubing"
- EMS 2503, "Specifications for Furnishing and Delivery of Polyethylene Plastic Piping."

B. Ensure that the pipe or tubing was manufactured at a Company approved plant listed in Gas Design Standard A-93 – Attachment B, "Approved PE Pipe/Tubing Manufacturers and Plants."

## 2. Fittings

A. Heat Fusion Fittings are described in Gas Design Standard B-90 and Gas Design Standard B-90.1.

B. Electrofusion Fittings are described in Gas Design Standard B-90.3.

C. For PE-to-PE mechanical connections, use the approved mechanical fittings shown in the following:

- Gas Design Standard B-90.1
- Gas Design Standard B-91
- Gas Design Standard B-91.1

D. Approved transition fittings are shown in the following:

- Gas Design Standard B-54
- Gas Design Standard B-91
- Gas Design Standard B-91.1
- Gas Design Standard B-91.5

E. IF a protective sleeve is supplied with a fitting,

THEN the sleeve must be installed. Information on ordering additional protection sleeves, when needed, is available in Gas Design Standard B-90.2, "Polyethylene (PE) System Accessories."

## 3. Valves

A. Refer to Gas Design Standard F-90, "Polyethylene (PE) Valves" and Gas Design Standard A-90, "Plastic Main and Service Installation" for isolation valve descriptions.

B. Excess Flow Valve (EFV) descriptions are provided in Gas Design Standard A-93.3, "Plastic Excess Flow Valves."

## Construction Materials (continued)

## 4. Risers

- A. Specifications for prefabricated risers are detailed in Gas Design Standard A-91.

## 5. Locating Wire and Electronic Marking (EMS)

- A. Locating wire, anode, bonding requirements, and electronic marking requirements are described in Gas Design Standard A-90.2.

**Construction Methods**

## 1. Polyethylene Pipe Handling

- A. Verify the print line on the pipe or tubing and document the date of manufacture, the manufacturer's name, and the SDR on the Plastic Pipe Inspection Data Stamp shown in Figure 3, before installation.

- B. Handle PE pipe carefully to eliminate the possibility of damage during loading, unloading, and storage operations.

- (1) During transport, the pipe must be supported to minimize movement and must be located away from any source of heat, such as equipment or vehicle exhaust.

- Protect pipe against ropes or other securing devices.
- Chains must not be used to secure the pipe.
- Supplies or other equipment must not be placed on top of the pipe.

- C. String coils of plastic pipe by hand or from a reel.

- (1) Coils of 4" diameter pipe and larger must be strung from an approved trailer designed for large-diameter, coiled PE pipe as described in Gas Design Standard M-17.2, "Large Diameter PE Coil Pipe Trailers and Accessories."

- Coils must NOT be rolled over sharp objects OR pulled over rough surfaces.
- String straight lengths by lifting the pipe from the truck to the ground.
- The pipe must be protected from rocks or other abrasive material during this operation and must NOT be dropped from a height.

**WARNING**

Observe proper safety precautions during field bending of pipe.  
Considerable force may be required to field bend pipe.

IF the pipe is released during bending,  
THEN the pipe may spring back forcibly.

## Construction Methods (continued)

- (2) Coiled PE pipe is confined with bands at intervals within the coils. As the pipe is uncoiled, take precautions to avoid kinking the pipe. Do NOT uncoil the pipe faster than the bands can be cut.
- D. Carefully inspect PE pipe for debris, kinks, gouges, scratches, punctures, and other imperfections after each of the handling operations and before/during installation.
- E. New PE pipe must be rejected, and installed pipe replaced, if defects or damages exceed 10% of the wall thickness of the pipe. Pipe wall thicknesses are listed in Gas Design Standard A-93, "Polyethylene Pipe Specifications and Design Considerations."

**CAUTION**

NEVER weld or thermite weld close to PE pipe without protecting the pipe with a heat-resisting baffle or wet rags.

- F. Do NOT perform welding on pipe immediately adjacent to plastic pipe in order to minimize the possibility of sparks or hot material coming into contact with the plastic pipe.
2. Control Static Charge Build-up in Polyethylene

**WARNING**

Provide static grounding, in all situations where gas is present or anticipated. The discharge of static electricity can cause shocks or ignite a gas-air mixture.

- A. Static-electric charges may build up on both the inside and outside surfaces of PE pipe. Localized, static-electric buildup occurs because PE pipe does not readily conduct electricity. See Utility Work Procedure WP4170-01, "Grounding Polyethylene (PE) Pipe to Control Static Electricity" for static-grounding procedures and requirements.
3. Depth of Cover for Main and Service
- A. For gas-only trench, refer to GDS A-04, "Cover and Clearance Requirements for Transmission Lines, Distribution Mains, and Service Lines."
  - B. For joint trench, refer to Utility Operations S5453, "Joint Trench."
4. Polyethylene Pipe Pressure Control (Squeeze-off)
- A. Squeeze off PE pipe to extend or repair it. PE pipe is flexible and can be squeezed shut without damaging the pipe or reducing its pressure rating, provided the proper tools and procedures are used. See Utility Work Procedure WP4170-02, "Squeezing Polyethylene (PE) Pipe" for squeeze-off procedures. Personnel are required to have the proper operator qualification (OQ) before controlling pressure using the PE pipe squeeze method.

## Construction Methods (continued)

## 5. Purging Plastic Mains and Services:

- A. Remove static-electric charges by grounding the pipe whenever the pipe is purged. Refer to Utility Work Procedure WP4170-01.
- B. Purge plastic mains and services according to the provisions specified in Gas Design Standard A-38, "Procedures for Purging Gas Facilities" as applicable. Personnel are required to have the proper OQ before purging pipe.
- C. IF the service has an excess flow valve

THEN follow the purging instruction in Gas Design Standard A-93.3.

## 6. Gauging Requirements / Continuity of Service

- A. It is Company policy to maintain uninterrupted service to customers during the construction, reconstruction, or maintenance of facilities as described in Distribution & Customer Service (DCS) Standard D-S0454, "Gas Mains, Maintaining Continuity of Service During Construction."

## 7. Backfill Requirements:

- A. Bedding must provide firm, continuous support under and around the PE pipe, and provide support for spans across gaps and holes. The backfill must be free of sharp objects, rocks, and large clods. The bedding materials used for support must be well-compacted. To prevent differential settlement, take extra care to provide proper compaction under pipes and fittings at branch and transition locations. Provide imported bedding for the pipe if the trench bottom is not smooth (refer to EMS 4123, "Backfill Sand").
- B. Compact the backfill at the sides of the PE pipe. Do not compact the backfill directly over the pipe until there is at least 12" of cover. Take care when dumping backfill material on top of PE pipe service connections or transition fittings.

**CAUTION**

DO NOT allow cement additives such as calcium oxide (quick lime) to come into contact with PE pipe, tubing or fittings.

- C. When using a flow-able fill, such as controlled density fill or slurry, provide a minimum of 6" of sand shading above and between the pipe and fittings.

## 8. Branch Service Installation

- A. Install branch services as described in Gas Design Standard A-42, "Standard Branch Service Installation."



## Construction Methods (continued)

- B. The branch service must be marked at the service valve as shown in Gas Design Standard A-42.
- C. Branch services must be identified on all map records.
- D. Service orders must be issued for all services that are installed or altered.

## 9. Change in Service Point Location (Flop Lots)

- A. When a change in service point location is required, contact the local area engineer for design changes as described in Gas Design Standard A-90.

## 10. Direct Burial

- A. Place joint trench gas facilities in the distribution trench per Utility Operations S5453. Placement in a Public Utility Easement (PUE) is preferred.
- B. A warning tape is to be installed in direct-burial installations per Gas Design Standard L-16, "Gas Pipeline Underground Warning Tape."

## 11. Insertion of Polyethylene Main and Service in Casing

**Note:** When inserting pipe, provide enough slack in all plastic lines before completing the final tie-in to avoid stress due to thermal expansion and contraction.

- A. Insert plastic pipe into an existing casing by performing the following steps:
  - (1) Clean the casing pipe.
  - (2) Ream the steel casings to protect the plastic main insert from the sharp edges of the casing. Where necessary, the entire length of the casing pipe must be reamed.
  - (3) The leading edge of the plastic pipe or tubing must be sealed during insertion.
  - (4) Push the plastic pipe through the casing.
  - (5) Evaluate the first 5' of the plastic pipe for damage as it leaves the casing pipe.
  - (6) IF there is damage that is caused by the casing pipe,

THEN remove the plastic pipe and repair the pipe as described in the section on PE pipe repair in this Gas Design Standard.

## Construction Methods (continued)

- B. Support exposed plastic at entry and exit points.
- (1) Plug the space between the plastic and the casing pipe (see Gas Design Standard A-90) with casing plugs or cable protectors, duct seal, or other suitable means not detrimental to PE pipe.
  - (2) Any non-cased plastic pipe must be well supported with backfill.
- C. Plastic pipe is approved for double insertion into existing mains and services. This application is approved provided the following conditions are met:
- (1) It is not practical or economical to remove the previously inserted pipe.
  - (2) The installation is made in accordance with Gas Design Standard A-75, "Gas Service and Mains in Plastic Casing" or Gas Design Standard A-90, as applicable, particularly with respect to protecting and supporting the entry and exit points.
  - (3) The installation is mapped with both the casing size and casing material identified. For example, a 1/2" plastic service inserted into a 1" copper pipe that is inserted into a 2" steel line is mapped as shown in Figure 2.

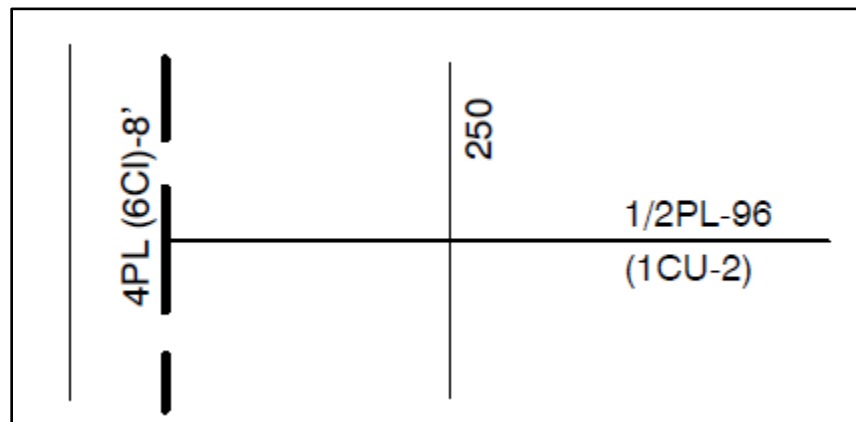


Figure 1. Mapping of a Double Insert

- D. Squeezing of the outer casing is ONLY allowed in the case of an emergency. If the outer casing pipe is squeezed, the casing must be grounded. The PE gas-carrier pipe must be replaced after flow control is no longer needed.
- (1) IF the outer casing is metallic (i.e., steel or copper),  
  
THEN ground the casing using a ground cable that is grounded to wet earth.
  - (2) IF the outer casing is PE,  
  
THEN ground the squeezer and casing as if the casing were the carrier pipe in accordance with the provisions of Utility Work Procedure WP4170-01.

## Construction Methods (continued)

(3) IF the casing is PVC or cast iron,

THEN remove the casing before squeezing the carrier pipe or tubing, and ground the carrier pipe in accordance with the provisions of Utility Work Procedure WP4170-01.

E. Take special precautions when accessing the carrier pipe (window cutting) to avoid damaging it.

(1) IF the pipe is damaged,

THEN the carrier pipe must be repaired by replacing the damage section of the carrier pipe.

## 12. Boring or Splitting of Polyethylene Main and Service

**Note:** When boring or splitting PE pipe, provide enough slack in all plastic lines before completing the final tie-in to avoid stress due to thermal expansion and contraction.

A. Ensure that the bore hole meets the 24" depth requirement for the main or service.

B. PE pipe may be pushed or pulled through a bore hole as described in the following:

- Horizontal Directional Drilling Manual
- Gas Design Standard M-70.7, "Pneumatic Piercing Tools"
- Gas Design Standard M-70.8, "Pneumatic Guided Piercing Tool"
- Utility Procedure TD-4412P-05, "Excavation Procedures for Damage Prevention"

C. During pipe pulling, constantly monitor the pulling force on the pipe and use a pulling head containing a weak-link or mechanical break-away as described in Gas Design Standard M-16.2, "Weak-link and Mechanical Breakaway Connectors."

D. During horizontal directional drilling (HDD) operations, the equipment gauge pressure must NOT be used to determine pulling forces on the pipe.

**CAUTION**

A weak-link or a mechanical break-away is critical to ensuring that PE pipe is installed without exceeding its design load.

E. Examine the pipe as it leaves the hole to determine if the speed of the pipe is smooth and continuous. Any delay in the pipe pulling may indicate that the pipe has "hung up" and has possible damage.

F. When installing PE using HDD, minimize variations in the bore to avoid adding drag when pulling back the pipe. Proper back-reaming and mudflow will help reduce the drag on PE when pulling back the pipe.

## Construction Methods (continued)

- G. PE services may be replaced using Utility Procedure TD-4634P-01, "Polyethylene Service Splitting."
- H. IF pipelines are installed using technologies where a casing may be required, including the following:
- HDD
  - Steel pipe splitting (Gas Design Standard A-36.1, "Splitting Steel Pipe")
  - Cast-iron pipe bursting

THEN it is acceptable to insert plastic pipe and tubing into a new plastic casing if the installation of the new plastic casing meets the following requirements:

- (1) All the current design requirements as specified in Gas Design Standard A-75 are satisfied.
- (2) The newly installed products are mapped correctly. For example, the bursting of a 4" cast-iron main for the placement of a 4" plastic main into a 6" plastic casing is mapped as follows: 4 - PL (6PL).

## 13. Riser Insert

- A. Before installing a service head adapter kit, inspect the PE tubing for damage.
- B. Instructions for service head adapters shown in Figure 3 are detailed in Utility Procedure TD-4170P-52.
- C. The plastic pipe must be supported by well-compacted sand or fine soil.
- D. Refer to Gas Design Standard A-90.2 for locating wire requirements.
- E. The air gap between the outside diameter of the service casing and the inside diameter of the sun shield must be between 1/2" and 3/4".

Construction Methods (continued)

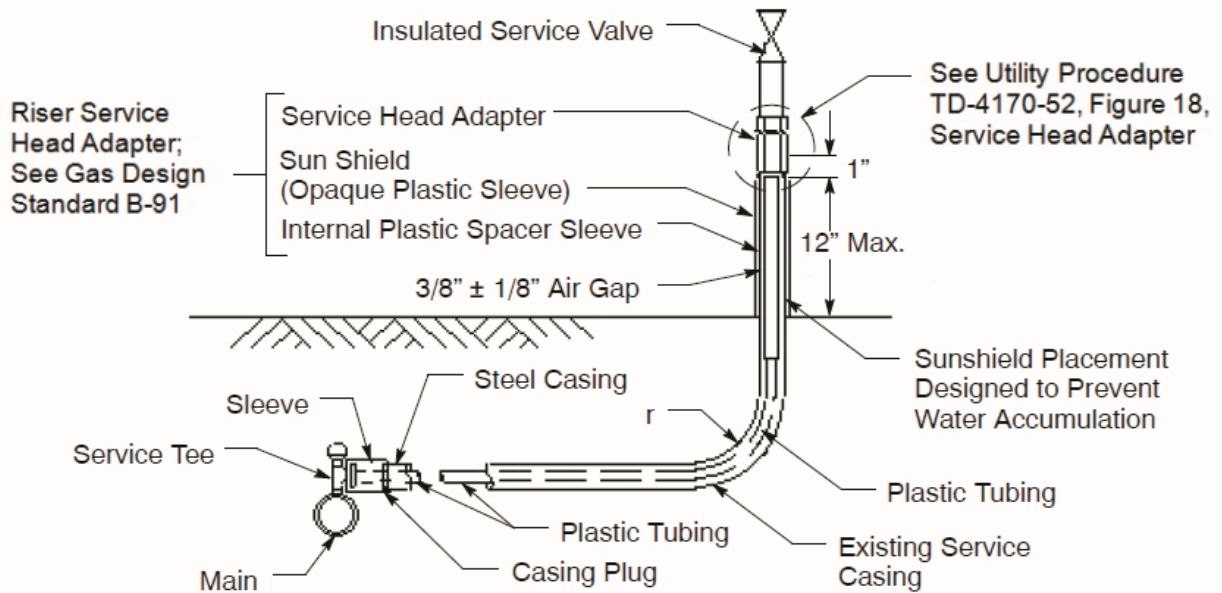


Figure 2. Typical Plastic Service Renewal

14. Unsupported Pipe Spacing

- A. Determine the maximum unsupported length of pipe in an excavation using Table 1 below.

Table 1. Maximum Unsupported Pipe Length

Nominal Size (in.)	Maximum (ft)
2	4.9
4	6.5
6	7.9
8	9.1

Polyethylene Pipe Repairs

1. Permanent Repairs

- A. Make permanent repairs by replacing the damaged segment of plastic pipe.
  - (1) Test segments of plastic pipe that are installed to replace damaged sections of mains and services according to the provisions in Gas Design Standard A-34.
    - a) Soap test mechanical fittings and couplings during leak testing.
    - b) Soap test the repair and squeeze areas after the repair is complete.
    - c) Thoroughly rinse any areas exposed to detergents with clear water.

Polyethylene Pipe Repairs (continued)

- (2) Clamp the exposed squeeze points on all 1-1/4” and larger Aldyl-A pipe with full-encirclement support clamps. The support clamps only provide support and are not intended for leak repair. Table 2 below provides information on support clamps (Aldyl-A pipe squeeze point only).

**Table 2. Support Clamps for Aldyl-A**

Size (Inches)	4” Wide Code	6” Wide Code
1-1/4 Continental (PVC)	024124	-
2 Continental (PVC)	033924	020588
2 Perfection (PA)	022831	-
3 Continental (PVC)	033925	020627
3 Perfection (PA)	022832	-
4 Continental (PVC)	033926	020628
4 Perfection (PA)	022840	-
6 Continental (PVC)	-	020631

- (3) Make permanent repairs to an Aldyl-A tapping tee, with black caps, that are leaking at the cap by installing an Aldyl-A electrofusion repair kit in accordance with Utility Procedure TD-4170P-57, “Polyethylene Tapping Tee Repair Kits.”
  - Aldyl-A tapping tees with black caps encountered during routine work, whether leaking or not, must be repaired by removing the existing cap and installing an Aldyl-A electrofusion repair kit.
- (4) Make permanent repairs to Plexco, Nipak, and Continental tapping tees with damaged caps by replacing the cap with the approved replacement caps listed in Gas Design Standard B-90.2.
- (5) A Performance Pipe 980 Quad Ring can be used to repair the Phillips Driscopipe old style orange resin tee (see Gas Design Standard B-90.2). The tee can be identified by the presence of a Quad Ring located at the top of the tapping tower.
- (6) Mechanical leak repair clamps may not be used as a repair method for plastic pipe.

## Polyethylene Pipe Repairs (continued)

- (7) Kerotest valves with compression ends, per Figure 3, are to be replaced if found leaking in the field.



**Figure 3. Kerotest Valve with Compression Ends**

2. Repair and Test Requirements for PE Pipe Damaged by Dig-In or Other Causes
  - A. Visually inspect the plastic pipe upstream and downstream from the area of contact. Replace only enough pipe to make a permanent repair. Pressure leak test plastic pipe to be used for repair on site. Leak test the replaced section according to the instructions in Gas Design Standard A-34.
  - B. IF the casing is damaged (broken, bent, or crushed),  
THEN replace the plastic carrier pipe 2' upstream and downstream of the dig-in location.
  - C. Repairing a service:
    - Refer to Utility Standard TD-4801S to determine if a service is to be repaired or replaced.
    - Service lines must be pressure tested from the point of disconnection to the riser.
    - In a dig-in situation, IF it appears that the pipe or casing was pulled or moved between the point of impact and the main,  
THEN leak test per Gas Design Standard A-34.
3. Repair Requirements for Plastic-Service Inserted Risers or Prefabricated Risers for Meter Sets Exposed to or Damaged by a Fire or Excessive Heat:
  - A. IF a PE service inserted riser or prefabricated riser may have been subjected to unusually high temperatures (such as being exposed to a house fire or meter fire),  
THEN replace either the plastic insert or the entire riser.

## Polyethylene Pipe Repairs (continued)

**CAUTION**

Pressure testing the service is NOT sufficient when a riser has been exposed to high temperatures. The plastic piping inside the riser could be damaged even though the pipe may hold during a leak test. When the service is used on a long-term basis, it could eventually rupture.

4. If a leak is identified on any fusion connection (i.e., butt, socket, saddle or electrofusion connection) during routine repair of any grade leak or any pressure test failure where the fusion is cut out,

THEN do the following:

- A. Safely stop the flow of gas.
- B. Submit a material problem (MPR), per Utility Procedure SCM-2106P-01, "Material Problem Report Procedure."
- C. Complete the following steps:
  - (1) Take a photo of the overall fusion and of the defect of the fusion prior to removal.
  - (2) Remove the leaking fusion by cutting a minimum of 12 in. from both sides of the joint.
  - (3) Tag and carefully package the fitting or connection along with the MPR number and leak notification number.
  - (4) Ship the package to the following address:

**ATTN: MPR Shed (Fusion Retrieval)**  
**3400 Crow Canyon Road**  
**San Ramon, CA 94583**

**Leak Testing**

1. Only those individuals trained and qualified pursuant to the Company's Operator Qualification (OQ) program may perform leak tests.

**CAUTION**

Do not use the squeeze-off technique to separate gas and air during an air test.

2. Pipe must be leak tested per Gas Design Standard A-34.



**Leak Testing (continued)**

3. IF a qualified individual completed a production PE connection that leaked/failed during a pressure test with no obvious material defects, the following actions must be performed immediately:
  - A. Qualified individual discontinues performing connections covered by the relevant qualification until requalified.
  - B. Submit a CAP item to gas qualifications personnel with the information below. For contractors and applicant installers, the overseeing PG&E employee may complete the following.
    - (1) Name of individual who produced the failed connection
    - (2) Type of connection
    - (3) Date of failure
    - (4) Any associated MPR Number
    - (5) Any applicable investigative information

**Note:** It is advisable to call the OQ group to schedule requalification, at 1-855-85-GO-CAP, Option 4.

4. If it is determined that the pressure test failure was not due to a material defect, the responsible employee must requalify.

**Records**

1. Retain records per the Record Retention Schedule.

**Target Audience**

Gas distribution engineers, gas planners, estimators, new business inspectors, maintenance and construction crews, materials inspectors, and personnel involved in PE pipe connection training and qualification

**Definitions**

- Imported Backfill:** Soils or man-made materials not native to the specific trench location for use in backfill. These materials will ensure that required compaction is achieved. See EMS 4123, for specific bedding and backfill requirements
- Stub Service:** Service piping extended from distribution facilities to provide for a future service completion.

**Acronyms and Abbreviations**

NA

**Compliance Requirement / Regulatory Commitment**

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.321, "Installation of plastic pipe"

**References**

Distribution & Customer Service (DCS) Standard D-S0454, "Gas Mains, Maintaining Continuity of Service During Construction"

EMS-2502, "Specifications for Furnishing and Delivery of Polyethylene (PE) Plastic Tubing, ½ in. and 1 in."

EMS-2503, "Specifications for Furnishing and Delivery of Polyethylene (PE) Plastic Piping, 1-1/4 in. to 10 in."

EMS-4123, "Backfill Sand"

Form TD-5100P-01-F01, "Leak Repair, Inspection, and Gas Quarterly Incident Report (A-Form)"

Gas Design Standard (GDS) A-34, "Piping Design and Test Requirements"

GDS A-36.1, "Splitting Steel Pipe"

GDS A-38, "Procedures for Purging Gas Facilities"

GDS A-42, "Standard Branch Service Installation"

GDS A-75, "Gas Service and Mains in Plastic Casing"

GDS A-90, "Plastic Main and Service Installation"

GDS A-90.2, "Locating Wire Installation for Mains and Services"

GDS A-91, "Prefabricated Risers"

GDS A-93, "Polyethylene Pipe Specifications and Design Considerations"

GDS A-93.3, "Plastic Excess Flow Valves"

GDS B-54, "Compression Couplings"

GDS B-90, "Plastic System Socket and Butt Fusion Fittings"

GDS B-90.1, "Plastic System Saddle Fittings"

GDS B-90.2, "Polyethylene (PE) System Accessories"

GDS B-90.3, "Electrofusion Fittings and Tapping Tees"

GDS B-91, "Transition Fittings for Polyethylene Pipe"

GDS B-91.1, "Polyethylene (PE) System Mechanical Fittings"

GDS B-91.5, "Cast Iron to Polyethylene Transition Fittings"

GDS D-34, "Qualifications for Joining Plastic Pipe"

GDS E-25, "Field Wrapping With Cold-Applied Tape"

GDS F-80, "Meter Valves"

GDS F-90, "Polyethylene (PE) Valves"

GDS L-16, "Gas Pipeline Underground Warning Tape"

GDS M-16.2, "Weak-link and Mechanical Breakaway Connectors Used in Polyethylene Pipe Installation"

GDS M-17.2, "Large Diameter PE Coil Pipe Trailers and Accessories"

GDS M-70.7, "Pneumatic Piercing Tools"

Utility Procedure TD-4170P-31, "Heat Iron Socket Fusion for Polyethylene Pipe"

Utility Procedure TD-4170P-32, "Heat Iron Saddle Fusion for Polyethylene Pipe (Manual)"

Utility Procedure TD-4170P-33, "Heat Iron Saddle Fusion for Polyethylene Pipe (Mechanical Assist Tool)"

Utility Procedure TD-4170P-34, "Heat Iron Butt Fusion for Polyethylene Pipe (Mechanical)"

Utility Procedure TD-4170P-35, "Heat Iron Butt Fusion for Polyethylene Pipe (Hydraulic)"

Utility Procedure TD-4170P-40, "Electrofusion for Polyethylene Pipe (Coupling)"

Utility Procedure TD-4170P-41, "Electrofusion for Polyethylene Pipe (Saddle)"

Utility Procedure TD-4170P-50, "Mechanical Fitting Connections for Polyethylene Pipe (Stub Outlet)"

Utility Procedure TD-4170P-52, "Mechanical Fitting Connections for Polyethylene Pipe (Threaded Compression Transitions)"

Utility Procedure TD-4170P-53, "Mechanical Fitting Connections for Polyethylene Pipe (Bolt-On Saddle)"

Utility Procedure TD-4170P-57, "Polyethylene Tapping Tee Repair Kits"

Utility Procedure TD-4412P-05, "Excavation Procedures for Damage Prevention"

Utility Procedure TD-4634P-01, "Polyethylene Service Splitting"

Utility Procedure TD-9500P-14, "Gas Service Record"

Utility Procedure WP4170-01, "Grounding Polyethylene (PE) Pipe to Control Static Electricity"

Utility Procedure WP4170-02, "Squeezing Polyethylene (PE) Pipe"

Utility Standard S5453, "Joint Trench"

Utility Standard TD-4801S, "Service Replacement Criteria"

### **Appendices**

NA

### **Attachments**

NA

### **Revision Notes**

Revision 9e has the following changes:

1. Section "Construction Materials," Step 3.A: Added a substep to state the following: "Kerotest valves with compression ends, per Figure 1, are to be replaced if found leaking in the field."

Revision 9d has the following changes: (Publication Date: 01/18/2019; Effective Date: 01/22/2019)

1. Section "Construction Methods," Step 1.D: Updated step to add "debris" and inspecting before/during installation.
2. Section "Polyethylene Pipe Repairs," Step 1.A: Added new sub-step (6) that mechanical repair clamps may not be used as a repair method for plastic pipe.

Revision 9c has the following changes (Publication Date: 10/17/2018; Effective Date: 11/16/2018):

1. Page 1: Deleted list of manuals containing this GDS.
2. Section "General Information," subsection 1., "Joining Polyethylene"
  - Added new section E to address Bulletin TD-A-93.1B-001, "Pressure Test Documentation."
  - Added new section F to address Bulletin TD-A-90B-002, "2" IPS Constab Re-Scope."

3. Section "General Information," subsection 3., "Riser Installation"
  - Step 3.A.(6): Updated GDS A-90.3 to GDS A-90.2.
  - Step 5.A: Added reference to TD-9500P-14.
4. Section "Construction Methods"
  - Step 8.D.: Deleted instruction about branch connection.
  - Step 13.D.: Updated GDS A-90.3 to GDS A-90.2.
  - Figure 3: Deleted links.
  - Added new Subsection 14, "Unsupported Pipe Spacing," including new Table 1.
5. Section "Polyethylene Pipe Repairs"
  - Step 2.C.: Changed "THEN pressure leak test the entire service per the instructions in Gas Design Standard A-34" to "THEN leak test per Gas Design Standard A-34."
  - Added new Subsection 4 to address Bulletin TD-A-93.1B-002, "Fusion Failure Reporting"
6. Section "Leak Testing"
  - Subsection 2: added recording.
  - Subsection 3: deleted.
  - Added new Subsections 3 and 4 on production PE connections that leak or fail during a pressure test.
7. Section "Records:" Replaced Subsection 1 with "See Gas Design Standard A-34 and TD-9500P-14 for required test documentation," addressing Utility Bulletin TD-A-93.1B-003.
8. "Definitions:" Deleted definitions for Leak Test, 2405, and 2708.
9. "References:" Updated and added references as necessary.
10. Utility Bulletin TD-A-90B-002 integrated into GDS A-93.1 and canceled.
11. Utility Bulletin TD-A-93.1B-003 integrated into GDS A-93.1 and canceled.

Revision 09b has the following changes (Publication Date: 10/18/2017):

1. Section "General Information," removed Step 5.
2. Section "Polyethylene Pipe Repairs," removed Step 1.
3. Section "Leak Testing," revised Step 2 and Step 3 to remove redundant information.

Revision 09a has the following changes:

1. In section "Records," added guidance about record retention.

Revision 09 has the following changes (Publication Date: 02-26-14):

1. Revised Gas Design Standard A-90 and Gas Design Standard A-93.1 to organize all design information for plastic pipe system in Gas Design Standard A-90 and construction information into Gas Design Standard A-93.1. Pipe sizing, installation depth, location from structures and other design information was removed from Gas Design Standard A-93.1 and placed into Gas Design Standard A-90 revision 6.
2. The title of A-93.1 has been changed from “Plastic Gas Distribution System Construction and Maintenance” to “Installing and Maintaining a Polyethylene Gas Distribution System”.
3. Added reference to 49 CFR 192.321 in scope.
4. Updated reference documents where required.
5. Added requirement in the General Information Section that new service locations be marked after installation to identify the new service location until maps are updated.
6. Added marking requirements for service construction as referenced in Utility Procedure TD-5811P-104.
7. Removed language for locating wire and EMS requirements and added reference to Gas Design Standard A-90.2 and Gas Design Standard A-90.3.
8. Removed information about controlling static charge build up already covered in the required Utility Work Procedure WP4170-01.
9. Removed information about PE pipe squeeze-off currently covered in the required Utility Work Procedure WP4170-02.
10. Instructions were added to the purging section to refer to Gas Design Standard A-93.3 when purging an excess flow valve.
11. Removed the static grounding procedure from “Purging” section and referred to Utility Work Procedure WP4170-01.
12. Added gauging/continuity of service reference for DCS Standard D-S0454.
13. Revised Standard Branch Service Installation to refer to Gas Design Standard A-42. When a branch connection is made as a result of an oral consent, the record of consent must be marked on the appropriate service order for permanent filing.
14. Added reference to warning tape requirements in direct bury installations, Gas Design Standard L-16.
15. Detail of weak-link and mechanical break-away instructions were removed from Gas Design Standard A-93.1 and placed into Gas Design Standard M-16.2.
16. Removed repair method for 10% gouge on pipe using a service saddle.

17. Added new permanent repair requirements for tapping tees.
18. Revised Plastic Pipe Stamp (Figure 3) to add pipe SDR/wall thickness.
19. Added reference information to Utility Standard TD-4801S to determine if a service is to be repaired or replaced.

**Asset Type:** Distribution Mains, Distribution Services

**Function:** Construction, Maintenance

**Document Contact:** [Gas Design Standard Responsibility List](#)