



GAS DESIGN STANDARD GAS SERVICE AND MAINS IN PLASTIC CASING

A-75

Publication Date: 03/23/2021 Effective Date: 03/23/2021 Rev. 2c

Purpose and Scope

This gas design standard (GDS) describes the use and design of PE 2708 and PVC casing material for use in PG&E's gas distribution system. PG&E uses PE 2708 and PVC plastic casing material to facilitate the installation of gas mains and services in residential and commercial subdivisions and for select gas main replacement projects. See the manufacturer's product manuals and catalogs and the GDSs listed in the "References" section below for more information.

This document also appears in the following manuals:

- *Electric and Gas Service Requirements (Greenbook)*
- *Gas Applicant Design Manual*

General Information

1. PE 2708 (MDPE) plastic casing material (sleeves and conduit) shall conform to Engineering Material Specification 2503 except as noted in Items 3 and 4 below.
2. PE 2708 casing material having SDRs not listed in Engineering Material Specification 2503 shall be tested and certified in accordance with ASTM D2513 - 18a.
3. PE 2708 casing material shall be yellow in color and marked with four orange stripes running the length of the casing. The width of the four orange stripes shall be 1/8" minimum for 2" IPS casing, and shall increase proportionally with increases in the casing size. The orange stripes shall be equally spaced around the circumference of the casing.
4. PE 2708 casing material shall have a printline stating "Natural Gas Sleeve" (instead of "Gas") running the length of the casing. All other marking information, to include the spacing of printline marks, shall be provided in accordance with the requirements listed in Engineering Material Specification 2503.
5. PVC plastic casing material (conduit) shall conform to Engineering Material Specification 64.
6. PVC plastic casing material shall conform to Numbered Document 062288.
7. PE 2708 casing material is preferred for service conduits and gas main casings. Use company-approved conduit for casing material when PE 2708 casing is not available.
8. The sizes and wall thickness of PE 2708 and PVC casing material, as shown in [Table 1](#) on Page 2, are approved for use in the PG&E system. The use of other sizes, SDRs, and grades of PE 2708 and PVC casing material must have the prior approval of engineering personnel.

General Information (continued)

Table 1. Approved PE 2708 and PVC Casings

Size (IPS)	Material ¹	SDR	Typical Construction Methods	OD (Inches)	ID (Inches)	Length ² (Feet)	Code	Wall Thickness (Inches)
2	PVC ^{3,4}	NA	Direct Bury (Stick)	2.375	2.161	20	016468	0.077
2	PE 2708	11	HDD (Stick) Direct Bury or Insert	2.375	1.917	20	021419	0.216
2	PE 2708	11	HDD (Coil)	2.375	1.917	500	021420	0.216
4	PVC ^{3,4}	NA	Direct Bury (Stick)	4.500	4.132	20	016472	0.154
4	PE 2708	13.5	HDD (Stick) Direct Bury or Insert	4.500	3.830	40	021421	0.333
4	PE 2708	13.5	HDD (Coil)	4.500	3.830	400	021422	0.333
6	PVC ^{3,4}	NA	Direct Bury (Stick)	6.625	6.111	20	016474	0.227
6	PE 2708	13.5	HDD (Stick) Direct Bury or Insert	6.625	5.643	40	021423	0.491
6	PE 2708	13.5	HDD (Coil)	6.625	5.643	400	021424	0.491
8	PE 2708	13.5	Direct Bury or Insert (Stick)	8.625	7.347	40	021425	0.639
12	PE 2708 ⁵	13.5	HDD (Stick) Direct Bury or Insert	12.750	10.862	40	021426	0.945

¹ Minimum order quantities apply.² Lengths are for sticks or coils. Smaller lengths are for sticks and larger numbers are for coils.³ Refer to [Numbered Document 062288](#) for material information and codes for couplings and PVC cement.⁴ Do not use HDD to install PVC casings.⁵ Size and dimensions not referenced in [Engineering Material Specification 2503](#). Dimensions shall conform to ASTM D2513 - 18a.

Application

1. The installation of plastic casing material should not to be used as a substitute for proper job scheduling for new business work.
2. The installation of PE 2708 or PVC gas main casings shall not be used to circumvent main line extension rules specified in [Gas Rule 15](#). PE 2708 or PVC main casings shall not be installed in any distribution trench, except under limited circumstances as stated in Items 3B and 3C below.

Application (continued)

3. PE 2708 and PVC casing material may be used to facilitate construction under limited circumstances.
 - A. PE 2708 or PVC service casings may be installed on new business work under any of the following circumstances:
 - (1) Paving of the property between the service stub and proposed meter site occurs before service completion.
 - (2) Completion of the gas service is impractical owing to the likelihood of damage to the service as a result of construction activities.
 - (3) The Company or applicant installer cannot meet the developer's construction scheduling requirements to construct the service completion.

Note: The applicant owns the empty service casing until a gas facility has been inserted and pressurized in accordance with Gas Rule 16. The applicant should be informed of the ownership requirements before construction. This includes the obligation to locate and surface mark the facility pursuant to a USA request and the responsibility to maintain serviceability of the casing and EMS devices. Do not install service casings in the public right of way.

- B. PE 2708 or PVC gas main casing material may be installed on new business work under either of the following circumstances:
 - (1) Paving of the street between an existing gas main and proposed gas main extension would occur before the distribution trench is constructed.
 - (2) Installation of the gas main is impractical owing to the likelihood of damage to the main as a result of construction activities.
- C. The installation of PE 2708 and PVC casings is limited to street crossings that do not traverse state highways or railroads. Refer to GDS A-70 for highway and railroad casing requirements.

Note: The applicant owns the empty casing until a gas facility has been inserted and pressurized in accordance with Gas Rule 15. The applicant should be informed of the ownership requirements before construction. This includes the obligation to locate and surface mark the facility pursuant to a USA request and the responsibility to maintain serviceability of the casing and associated appurtenances.

Application (continued)

- D. PE 2708 gas main casing material may be installed on reconstruction work under any of the following circumstances:
- (1) The replacement method specified involves cast iron bursting or steel pipe splitting.
 - (2) The replacement method specifies using HDD to cross streets or thoroughfares other than state highways or railroads. Refer to GDS A-70 for highway and railroad casing requirements.
 - (3) Paving of the street between an existing gas main and proposed gas main extension occurs before the distribution trench is constructed.
 - (4) Installation of the gas main is impractical owing to the likelihood of damage to the main as a result of construction activities.
- E. PVC gas main casing material may be installed on reconstruction work on a case by case basis.
- F. PE 2708 and PVC gas main casing material may not be installed as a casing for PE pipe on bridges. Refer to GDS A-33.1 for PE casing requirements on bridge structures.
- G. PE 2708 and PVC gas main casing material may not be installed as a casing for steel mains or services.
- H. Gas mains and services shall not be inserted into existing service casings or gas main sleeves that do not meet the requirements of this GDS document unless approved by gas engineering personnel.
- I. Service casings and gas main sleeves installed on new business work are non-refundable items.
- J. If another utility or entity encroaches upon a service casing or gas main sleeve on a new business job, the applicant is responsible for providing an alternative trench or removing the other utility's or entity's facility before installing the gas main or service. Contact the rates and tariffs personnel for assistance in resolving these matters.
- K. If another utility or entity encroaches upon a gas main casing on a reconstruction job, contact the encroaching party and have them remove their facility. Contact Company legal personnel for assistance in these matters.
- L. The approval to install service and gas main casings shall be made before construction by gas engineering personnel.

Limitations

1. Do not install PE 2708 or PVC casing materials where operating temperatures exceed 140°F. Do not install PE 2708 or PVC casing materials within 10' of steam lines or other sources of heat, or at a distance such that the temperature on the PE 2708 or PVC casing materials could exceed 100°F, unless an insulating barrier is provided to ensure that the temperature of the PE 2708 or PVC casing materials is always below 100°F. Crossings of PE 2708 or PVC casing materials and steam lines are allowed if a thermal insulating barrier is provided and the 100°F temperature limit is maintained. Note: PVC casing material is rated at 194°F. However, the gas carrier pipe is limited to 100°F.
2. Do not install PE 2708 or PVC casing materials in aboveground locations, or where the material could be exposed to UV radiation. PE 2708 or PVC casing materials do not provide sufficient mechanical protection for aboveground installations.
3. Contact gas engineering personnel to assess chemical compatibility with PE 2708 or PVC.
4. PE 2708 or PVC service casings used to facilitate applicant installations are allowed to be installed on private property only. Refer to Gas Rule 16 for ownership requirements and responsibility to furnish materials. PE 2708 or PVC service casings shall be installed at or within the property line and terminate past the paved area with sufficient clearance to insert the gas service (carrier pipe), tie into the existing stub, and set the riser. Follow the requirements of GDS A-90 for the installation of stub services, plastic service completions, and riser installation details.
5. EFVs, couplings, fittings, curb valves, or other appurtenances shall not be installed within a PE 2708 or PVC service conduit. Install EFVs in accordance with the requirements of GDS A-90 and GDS A-93.3.
6. Service casing shall run in a straight line. Ensure that any sag or over bends are gradual.
7. Refer to [Table 2](#) on Page 6 for recommended casing sizes by gas carrier pipe size.
8. The maximum permissible length of a gas main casing is determined by the safe pulling loads. Refer to Chapter 6 of the *Horizontal Directional Drilling Manual* and GDS A-93.1 for specific guidance in determining allowable loads.
9. PE 2708 and PVC gas main sleeves and service conduits shall not branch or have elbows, reducers, or other inline fittings (except for electrofusion couplings) connected to it.
10. Gas main and service casings shall not contain any other facility other than the natural gas carrier pipe and associated locating wire.
11. When economically feasible, PE 2708 and PVC service casings may be accessed for branch installations. Follow the requirements of Item 2 on Page 8 for accessing service casings.

Limitations (continued)

Table 2. Casing Selection Guide

Gas Carrier Size (IPS) (Inches)	Recommended Casing Size (Inches)
2	4
	6
3	6
4	8
6	12
8	12

Installation Requirements

1. When installing the main or service, ensure that proper alignment and adequate support are provided where the pipe enters and leaves so that no strain will be placed on the carrier pipe.
2. Link seals and split end seals are not required on PE 2708 or PVC casings.
3. Follow the requirements of GDS A-93.1 for PE 2708 installation in a casing or bore hole.
4. PE 2708 and PVC casing materials shall be installed in backfill meeting the requirements specified in Exhibit B of Utility Standard S5453, "Joint Trench Configurations and Occupancy Guide."
5. All empty PE 2708 and PVC service conduits and gas main sleeves shall be capped before backfilling. Install plastic caps or redwood plugs in accordance with GDS A-81. Install EMS markers on both ends of the gas main sleeve or service conduit in accordance with GDS A-93.1.
6. If necessary, use a mandrel to prove that all service conduits and gas main sleeves are free and clear of dirt, rocks, and other debris before inserting a gas carrier pipe.
7. Where several service conduits have been installed in a joint trench, contact the other utilities involved to request that they seal the ends of their conduits adjacent to the building. A request should be made to each of the other utilities involved for their cooperation. Explain the reason for the seal, and the potential hazard of migrating gas.
8. Provide slack for the carrier pipe so that thermal contraction will not produce tension on the pipe or any fittings or connections.
9. PE 2708 service conduits and gas main sleeves shall be joined by the heat fusion methods prescribed in Table 7 of GDS A-93.1 or by electrofusion. All PE heat fusions and electrofusion connections shall be made in accordance with appropriate company heat fusion procedures. A current GDS D-34 qualification is not required to connect (join) casing materials.

Installation Requirements (continued)

10. Install all PVC service casings in accordance with PG&E Numbered Document 062288.
11. PE 2708 and PVC gas main casings shall be installed to the greatest extent practical at an approximate 90° angle between the existing distribution main and the street or proposed paved area at the point of crossing.
12. PE 2708 and PVC gas main sleeves shall be installed with a minimum cover as specified in GDS A-93.1, unless it is installed in a joint trench crossing a street (paved) area where the cover requirement is determined by Exhibit B of Utility Standard S5453, "Joint Trench Configurations and Occupancy Guide." If a gas main sleeve is installed in a joint distribution trench, the gas main sleeve shall be in the same relative location in the distribution trench and shall have the same clearance from other structures that would be required for a direct burial installation.
13. PE 2708 and PVC service conduit shall be installed with a minimum cover as specified in GDS A-93.1, unless it is installed in a joint service trench where the cover requirement is determined by Exhibit B of Utility Standard S5453, "Joint Trench Configurations and Occupancy Guide." If a service conduit is installed in a joint service trench, the conduit shall be in the same relative location in the service trench and shall have the same clearance from other structures that would be required for a direct burial installation.
14. PE 2708 and PVC casings shall not be installed at a depth greater than the depths specified in Table 3 of GDS A-81.
15. All service conduits and gas main sleeves shall have a locating wire attached per the requirements of GDS A-90.2 or GDS A-90.3, as applicable. The locating wire may terminate either at the casing ends in an ETS or be connected to the locating wires on both ends of the casing.
16. PE 2708 and PVC service and PE 2708 gas main casings do not need to be leak tested.
17. PE 2708 and PVC service and PE 2708 gas main casings do not need to have vents installed except as noted in Item 18A below.
18. After the carrier (service) pipe is installed in the casing, the end of the casing nearest the house or structure being supplied shall be sealed so that any leaking gas cannot migrate through the casing to the building.
 - A. If the properly sized casing plug is available for PE 2708 casings, as listed in GDS B-90.2, use it for this purpose. Wrap the casing plug with Tac-Tape (Code 507036) or equivalent tape wrap. If a suitable plug is not available, a plug of duct seal at least 1" long should be used, followed by the Tac-Tape or equivalent. If the other end of the service conduit for the gas line terminates near another building or structure into which gas could migrate, take special precautions to vent the casing to a safe location.
 - B. PVC service conduit shall be sealed in accordance with Item 18A above.

Installation Requirements (continued)

19. A 3" wide plastic marking tape with the words "Gas Line in Conduit" (Code 373371) shall be installed on PVC service conduit. The marking tape shall be spiral wrapped around the casing for its entire length and held in place with adhesive tape at 10' intervals. The marking tape shall be wrapped such that the horizontal distance between spirals does not exceed 36".
20. The owner of an empty casing shall furnish to PG&E, prior to acceptance of the casing, an as-built drawing (or service record) and a PG&E inspection record indicating that the casing was installed pursuant to this document.
21. Where a gas service or main is installed in a sleeve or conduit, document the information on the plat sheet and service order, as applicable. Refer to GDS A-93.1 for mapping and records management requirements.

Maintenance and Operations

1. Gas crews and other employees who could respond to a gas emergency should be made aware that some services and mains have been installed through plastic sleeves and conduits. They should be trained on how to recognize and to squeeze off pipe that has been so installed.
2. PE 2708 and PVC service conduits and gas main sleeves may be accessed by window cutting using Company-approved tools. Precautions shall be taken to avoid damaging the carrier pipe.
3. A gas service or main that is installed in a service conduit or gas main sleeve that has been squeezed off must be replaced. GDS A-93.1 provides specific replacement instructions.
4. Repair all damaged PVC service conduit in accordance with Numbered Document 058548.
5. If a broken service conduit or any other problems brought about by using a casing delays Company work, bill the applicant for lost time and associated repair or replacement costs before service completion.

Target Audience

Personnel who are involved in designing, procuring, or installing the equipment or material listed in this standard.

Definitions

Casing For the purposes of this gas design standard, a casing is also referred to as a sleeve or conduit. Casings are not pressurized and shall only be used to insert a natural gas carrier pipe.

Compliance Requirement/Regulatory Commitment

Code of Federal Regulations (CFR) Title 49, Transportation, Part 192—Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards

Records and Information Management:

Information or records generated by this procedure must be managed in accordance with the Enterprise Records and Information (ERIM) Policy, Standards and Enterprise Records Retention Schedule (ERRS). Refer to GOV-7101S, “Enterprise Records and Information Management Standard,” and related standards. Management of records includes, but is not limited to:

- Integrity
- Storage
- Retention and Disposition
- Classification and Protection

References

ASTM D638, “Standard Test Method for Tensile Properties of Plastics”

ASTM D1785-89, “Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120”

ASTM D2513 - 18a, “Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings”

ASTM F512, “Standard Specification for Smooth Wall Polyvinyl Chloride (PVC) Conduit and Fittings for Underground Installation”

Engineering Material Specification 64, “Specification for Polyvinyl Chloride (PVC) Conduits and Fittings”

Engineering Material Specification 2503, “Specifications for Furnishing and Delivery of Polyethylene (PE) Plastic Piping”

Gas Design Standard A-33.1, “Plastic Gas Lines on Bridge Structures”

Gas Design Standard A-36, “Design and Construction Requirements – Gas Lines and Related Facilities”

Gas Design Standard A-70, “Casings for Highway and Railroad Crossings”

Gas Design Standard A-81, “Plugs and Caps for Non-Pressurized Gas Pipelines”

Gas Design Standard A-90, “Plastic Main and Service Installation”

Gas Design Standard A-90.2, “Locating Wire Installation for Direct Burial Plastic Mains and Services”

References (continued)

Gas Design Standard A-90.3, "Locating Wire Installation for Inserted Plastic Mains and Services"

Gas Design Standard A-93, "Polyethylene Pipe Specifications and Design Considerations"

Gas Design Standard A-93.1, "Plastic Gas Distribution System Construction and Maintenance"

Gas Design Standard A-93.3, "Excess Flow Valves"

Gas Design Standard B-90, "Plastic System Socket and Butt Fusion Fittings"

Gas Design Standard B-90.2, "Plastic System Accessories"

Gas Design Standard D-34, "Qualifications for Joining Plastic Pipe"

Gas Rule 15, "Gas Main Extensions"

Gas Rule 16, "Gas Service Extensions"

Numbered Document 058548, "Repairing Plastic Conduit and Fittings"

Numbered Document 062288, "Underground Conduits"

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

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 Standard S5453, "Joint Trench"

Appendices

NA

Attachments

NA

Revision Notes

Revision 2c has the following changes:

1. Updated reference to ASTM D2513 (now ASTM D2513 - 18a) in the following:
 - General Information 2
 - General Information Table 1, Footnote 5
 - References (Also, replaced title ASTM D2513, “Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings,” [now ASTM D2513 - 18a, “Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings”]).
2. Removed hyperlinks per current document management process.
3. In Compliance Requirement / Regulatory Commitment section, added boilerplate language on “Records and Information Management.”

Revision 2b (Publication Date: 05/20/2020, Effective Date: 08/20/2020) has the following changes:

1. Throughout the entire document, made the following changes:
 - Moved the contents from a PDF format into a Word format.
 - Updated “PE 2406” designation to “PE 2708.”
 - Removed reference to “plastic hotline.”
 - Changed “numbered document” to “gas design standard” or “GDS.”
 - Corrected internal references to pages, tables, items, and steps.
2. In the “General Information” section, updated the following:
 - Step 7: Changed second sentence to “Use company approved conduit for casing material when PE 2708 casing is not available.”
 - Step 8: Updated “gas transmission and distribution technical services” to “engineering personnel.”
3. In the “Application” section, the note after Step 3, removed “Note that the service casings may only be installed on private property.”
4. In the “Limitations” section, updated the following:
 - Step 3: Deleted first sentence. “Do not install PE 2406 or PVC casing materials in subsurface locations that are contaminated with hydrocarbons or other volatile organic compounds.”
 - Step 4: Changed “PE 2406 or PVC service casings shall only be installed on private property” to “PE 2708 or PVC service casings used to facilitate applicant installations are allowed to be installed on private property only.”
 - Step 6: Removed first sentence stating “The maximum permissible length of the service casing is 200 ft.”

Revision Notes (continued)

5. In the “Installation Requirements” section, changed the following:

- Step 6: Updated “A mandrel shall be used ...” to “If necessary, use a mandrel”
- Step 9: Updated second sentence to read “All PE heat fusions and electrofusion connections shall be made in accordance with appropriate company heat fusion procedures.”
- Step 21: Removed reference to the obsolete Utility Standard D-S0457.

6. In the “References” section, changed the following:

- Removed reference for WP4170-06, “Polyethylene Heat Iron Butt Fusion.”
- Removed reference for WP4170-07, “Polyethylene Electrofusion Coupling and Saddle Connections.”
- Updated WP4170-04 to TD-4170P-31, “Heat Iron Socket Fusion for Polyethylene Pipe.”
- Updated WP4170-05 to TD-4170P-33 “Heat Iron Saddle Fusion for Polyethylene Pipe (Mechanical Assist Tool).”
- Added new reference for TD-4170P-34, “Heat Iron Butt Fusion for Polyethylene Pipe (Mechanical).”
- Added new reference for TD-4170P-35, “Heat Iron Butt Fusion for Polyethylene Pipe (Hydraulic).”
- Added new reference for TD-4170P-40, “Electrofusion for Polyethylene Pipe (Coupling).”
- Added new reference for TD-4170P-41, “Electrofusion for Polyethylene Pipe (Saddle).”

Revision 2a (Publication Date: 05/04/2009; Effective Date: none) has the following changes:

1. Added section records.

Revision 02 has the following changes:

1. Updated the “Acronyms” and “References” sections.
2. Added new Footnote 1 and rearranged the sequence of all footnotes in Table 1 on Page 3.
3. Expanded note following Item 11A(3) on Page 4.
4. This document is part of Change 61.

Asset Type: Distribution Mains, Distribution Services

Function: Design, Construction, Maintenance

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