
	GAS SERVICE AND MAINS IN PLASTIC CASING		A-75
	Asset Type: Gas Transmission and Distribution	Function: Construction	
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Rev. #02: This document replaces Revision #01. For a description of the changes, see Page 7.			

This document also appears in the following manuals:

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

Purpose and Scope

This numbered document describes the use and design of PE 2406 and PVC casing material for use in PG&E's gas distribution system. PG&E uses PE 2406 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 numbered documents listed in the "References" section below for more information.

Acronyms

- ASTM: American Society for Testing and Materials
- EFV: excess flow valve
- EMS: electronic marker system
- ETS: electrolysis test station
- F: Fahrenheit
- HDD: horizontal directional drilling
- ID: inside diameter
- IPS: iron pipe size
- MDPE: medium-density polyethylene
- NA: not applicable
- OD: outside diameter
- PE: polyethylene
- PG&E: Pacific Gas and Electric Company
- PVC: polyvinyl chloride
- QC/S: Qualified Contractor/Subcontractor
- SDR: standard dimensional ratio
- USA: Underground Service Alert
- UV: ultraviolet

References

	Document
Plastic Gas Lines on Bridge Structures	A-33.1
Design and Construction Requirements – Gas Lines and Related Facilities	A-36
Casings for Highway and Railroad Crossings	A-70
Plugs and Caps for Non-Pressurized Gas Pipelines	A-81
Plastic Main and Service Installation	A-90
Locating Wire Installation for Direct Burial Plastic Mains and Services	A-90.2
Locating Wire Installation for Inserted Plastic Mains and Services	A-90.3
Polyethylene Pipe Specifications and Design Considerations	A-93
Plastic Gas Distribution System Construction and Maintenance	A-93.1
Excess Flow Valves	A-93.3
Plastic System Socket and Butt Fusion Fittings	B-90

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References, continued	Document
Plastic System Accessories	B-90.2
Qualifications for Joining Plastic Pipe	D-34
Gas Services – Residential Branch Installations	Utility Standard D-S0455
Gas Mapping Standard – 1” = 100’ Plat Sheets	Utility Standard D-S0457
Joint Trench	Utility Standard S5453
Polyethylene Heat Iron Socket Fusion	Utility Work Procedure WP4170-04
Polyethylene Heat Iron Saddle Fusion	Utility Work Procedure WP4170-05
Polyethylene Heat Iron Butt Fusion	Utility Work Procedure WP4170-06
Polyethylene Electrofusion Coupling and Saddle Connections	Utility Work Procedure WP4170-07
Repairing Plastic Conduit and Fittings	058548
Underground Conduits	062288
Specification for Polyvinyl Chloride (PVC) Conduits and Fittings	*EMS 64
Specifications for Furnishing and Delivery of Polyethylene (PE) Plastic Piping	*EMS 2503
<i>Horizontal Directional Drilling Manual</i>	
Gas Main Extensions	Gas Rule 15
Gas Service Extensions	Gas Rule 16
Standard Test Method for Tensile Properties of Plastics	ASTM D638
Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120	ASTM D1785-89
Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings	ASTM D2513
Standard Specification for Smooth Wall Polyvinyl Chloride (PVC) Conduit and Fittings for Underground Installation	ASTM F512

Definition

Casing: For the purposes of this numbered document, 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.

General Information

1. PE 2406 (MDPE) plastic casing material (sleeves and conduit) shall conform to Engineering Material Specification 2503 except as noted in Items 3 and 4.
2. PE 2406 casing material having SDRs not listed in Engineering Material Specification 2503 shall be tested and certified in accordance with ASTM D2513.
3. PE 2406 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 2406 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 2406 casing material is preferred for service conduits and gas main casings. Use ASTM F512 PVC DB-120 for casing material when PE 2406 casing material is not available.
8. The sizes and wall thickness of PE 2406 and PVC casing material, as shown in Table 1 on Page 3, are approved for use in the PG&E system. The use of other sizes, SDRs, and grades of PE 2406 and PVC casing material must have the prior approval of gas transmission and distribution technical services personnel. Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for assistance.

*EMS here refers to Engineering Material Specification.

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Table 1 Approved PE 2406 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 2406	11	HDD (Stick) Direct Bury or Insert	2.375	1.917	20	021419	0.216
2	PE 2406	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 2406	13.5	HDD (Stick) Direct Bury or Insert	4.500	3.830	40	021421	0.333
4	PE 2406	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 2406	13.5	HDD (Stick) Direct Bury or Insert	6.625	5.643	40	021423	0.491
6	PE 2406	13.5	HDD (Coil)	6.625	5.643	400	021424	0.491
8	PE 2406	13.5	Direct Bury or Insert (Stick)	8.625	7.347	40	021425	0.639
12	PE 2406 ^{5, 6}	13.5	HDD (Stick) Direct Bury or Insert	12.750	10.862	40	021426	0.945

¹ Minimum order quantities apply. Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for assistance.

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.

⁶ Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for procedures and equipment for fusing 12" IPS casing material.

Application

9. The installation of plastic casing material should not to be used as a substitute for proper job scheduling for new business work.
10. The installation of PE 2406 or PVC gas main casings shall not be used to circumvent main line extension rules specified in [Gas Rule 15](#). PE 2406 or PVC main casings shall not be installed in any distribution trench, except under limited circumstances as stated in items 11B and 11C.
11. PE 2406 and PVC casing material may be used to facilitate construction under limited circumstances.
 - A. PE 2406 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.

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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. Note that the service casings may only be installed on private property. Do not install them in the public right of way.

B. PE 2406 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.

The installation of PE 2406 and PVC casings is limited to street crossings that do not traverse state highways or railroads. Refer to Numbered Document 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.

C. PE 2406 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 Numbered Document 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.

CI. PVC gas main casing material may be installed on reconstruction work on a case by case basis. Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for assistance.

CII. PE 2406 and PVC gas main casing material may not be installed as a casing for PE pipe on bridges. Refer to Numbered Document A-33.1 for PE casing requirements on bridge structures.

CIII. PE 2406 and PVC gas main casing material may not be installed as a casing for steel mains or services.

CIV. Gas mains and services shall not be inserted into existing service casings or gas main sleeves that do not meet the requirements of this numbered document unless approved by gas engineering personnel. Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for assistance.

CV. Service casings and gas main sleeves installed on new business work are non-refundable items.

CVI. 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.

CVII. 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.

The approval to install service and gas main casings shall be made before construction by gas engineering personnel.

Limitations

12. Do not install PE 2406 or PVC casing materials where operating temperatures exceed 140°F. Do not install PE 2406 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 2406 or PVC casing materials could exceed 100°F, unless an insulating barrier is provided to ensure that the temperature of the PE 2406 or PVC casing materials is always below 100°F. Crossings of

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PE 2406 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.

13. Do not install PE 2406 or PVC casing materials in aboveground locations, or where the material could be exposed to UV radiation. PE 2406 or PVC casing materials do not provide sufficient mechanical protection for aboveground installations.
14. Do not install PE 2406 or PVC casing materials in subsurface locations that are contaminated with hydrocarbons or other volatile organic compounds. Contact gas engineering personnel to assess chemical compatibility with PE 2406 or PVC.
15. PE 2406 or PVC service casings shall only be installed on private property. Refer to [Gas Rule 16](#) for ownership requirements and responsibility to furnish materials. PE 2406 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 Numbered Document A-90 for the installation of stub services, plastic service completions, and riser installation details.
16. EFVs, couplings, fittings, curb valves, or other appurtenances shall not be installed within a PE 2406 or PVC service conduit. Install EFVs in accordance with the requirements of Numbered Documents A-90 and A-93.3.
17. The maximum permissible length of the service casing is 200'. Service casing shall run in a straight line. Ensure that any sag or over bends are gradual.
18. Refer to Table 2 on Page 5 for recommended casing sizes by gas carrier pipe size.
19. 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 Numbered Document A-93.1 for specific guidance in determining allowable loads.
20. PE 2406 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.
21. Gas main and service casings shall not contain any other facility other than the natural gas carrier pipe and associated locating wire.
22. When economically feasible, PE 2406 and PVC service casings may be accessed for branch installations. Refer to Utility Standard D-S0455 and Numbered Document A-93.1 for branch requirements. Follow the requirements of Item 45 on Page 7 for accessing service casings.

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

23. 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.
24. Link seals and split end seals are not required on PE 2406 or PVC casings.
25. Follow the requirements of Numbered Document A-93.1 for PE 2406 installation in a casing or bore hole.
26. PE 2406 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".

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27. All empty PE 2406 and PVC service conduits and gas main sleeves shall be capped before backfilling. Install plastic caps or redwood plugs in accordance with Numbered Document A-81. Install EMS markers on both ends of the gas main sleeve or service conduit in accordance with Numbered Document A-93.1.
28. A mandrel shall be used 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.
29. 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.
30. Provide slack for the carrier pipe so that thermal contraction will not produce tension on the pipe or any fittings or connections.
31. PE 2406 service conduits and gas main sleeves shall be joined by the heat fusion methods prescribed in Table 7 of Numbered Document A-93.1 or by electrofusion. All PE 2406 heat fusions and electrofusion connections shall be made in accordance with WP4170-04, WP4170-05, WP4170-06, and WP4170-07. A current Numbered Document D-34 qualification is **not** required to connect (join) casing materials.
32. Install all PVC service casings in accordance with PG&E Numbered Document 062288.
33. PE 2406 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.
34. PE 2406 and PVC gas main sleeves shall be installed with a minimum cover as specified in Numbered Document 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.
35. PE 2406 and PVC service conduit shall be installed with a minimum cover as specified in Numbered Document 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.
36. PE 2406 and PVC casings shall not be installed at a depth greater than the depths specified in Table 3 of Numbered Document A-81.
37. All service conduits and gas main sleeves shall have a locating wire attached per the requirements of Numbered Documents A-90.2 or 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.
38. PE 2406 and PVC service and PE 2406 gas main casings do not need to be leak tested.
39. PE 2406 and PVC service and PE 2406 gas main casings do not need to have vents installed except as noted in Item 40A below.
40. 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 2406 casings, as listed in Numbered Document 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 40A above.
41. 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".
42. 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.

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43. 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 Numbered Document A-93.1 and Utility Standard D-S0457 for mapping and records management requirements.

Maintenance and Operations

44. 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.
45. PE 2406 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. Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for Company-approved materials for cutting and accessing PE 2406 and PVC service conduits and gas main sleeves.
46. A gas service or main that is installed in a service conduit or gas main sleeve that has been squeezed off must be replaced. Numbered Document A-93.1 provides specific replacement instructions.
47. Repair all damaged PVC service conduit in accordance with Numbered Document 058548.
48. Contact the plastic hotline at Company phone 223-9161 (415-973-9161) for assistance in repairing damaged PE 2406 casings.
49. 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.

Revision Notes

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.