



GAS DESIGN STANDARD

COVER AND CLEARANCE REQUIREMENTS FOR TRANSMISSION LINES, DISTRIBUTION MAINS, AND SERVICE LINES

A-04

Publication Date: 07/24/2021 Effective Date: 10/01/2021 Rev. 0d

Purpose and Scope

This Gas Design Standard (GDS) establishes minimum cover and clearance requirements for Pacific Gas and Electric Company (Company) buried gas transmission lines, gas distribution mains, and gas service lines that do not cross highways or railroads. Its purpose is for public safety and to meet all governmental and other requirements. These cover and clearance requirements are applicable to the installation of new, replaced, or relocated gas facilities. This GDS also discusses minimum clearances by facility type.

General Information

1. The cover and clearance requirements in this GDS meet or exceed the minimum requirements established in Code of Federal Regulations 49 (CFR) Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards," and CPUC General Order (G.O.) 112-F, "State of California Rules Governing Design, Construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems."
 - A. Additional cover or clearances may be required where conditions warrant, as well as to meet any additional requirements contained in right-of-way documents.
 - B. In instances where it is impractical to provide these minimum cover and clearances, or where damage from external loading must be prevented, the local engineer must ensure pipe is cased or protected by a permanent bridging structure which will handle any anticipated loading as described in 49 CFR 192.327, "Cover." For these conditions for transmission pressure facilities, refer to Utility Procedure TD-4813P-01, "Gas Transmission Pipelines Reduced Cover Evaluation" for further guidance.
2. All approvals for reduced cover and clearance must be documented in an approved project management tool. If one approval covers multiple projects, then the approval must be recorded in the project management tool for each individual project.
3. Refer to Interim Standard 463-3, "Gas Pipe Crossing of State Highways and Freeways" for minimum cover requirements for highway crossings.
4. Refer to GDS A-70, "Casings for Highway and Railroad Crossings" for specifications and illustrations of casings for highways and railroad crossings.

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5. For existing steel pipelines (transmission, distribution main, or service) found to have less than 6 inches radial clearance from metallic structures not associated with the steel pipeline, the following requirements apply:
 - A. Before backfilling the excavation, the steel pipeline must be protected by doing one of the following, in order of preference:
 - (1) Relocate steel pipeline to minimum clearances listed in the Clearance Requirements section of this GDS.
 - (2) Install at least one sheet of Delrin (material code M569264) as close as possible to the metallic structure.
 - (3) Install Rockguard or Tuff N Nuff between the steel pipeline and the metallic structure per GDS E-35.9, "Coating Protection Systems for Harsh Backfill Environments."
 - B. If steel pipeline parallels the metallic structure, it is only necessary to protect the pipe within the extent of the original excavation. Create a CAP issue for integrity management to track and prioritize the remaining steel pipeline with reduced clearance.
6. These cover and clearance requirements are applicable to the installation of new, replaced, or relocated gas facilities. The requirements are not retroactive to existing facilities which have less than the specified cover or clearance, either because they were installed prior to the adoption of applicable governmental regulations or because the cover was reduced after the main or service line was installed. However, where an existing line is found to have cover or clearance less than that specified by 49 CFR Part 192, consult with appropriate gas engineering personnel or supervisor and reference 49 CFR 192.327 for additional cover requirements. Also, some right-of-way and permit documents require the Company to maintain a minimum cover over a pipeline. Where such a requirement exists, it must be complied with.

Cover Requirements

1. Transmission Facilities

- A. Minimum cover for buried gas transmission facilities are specified in Table 1.

Table 1. Minimum cover for gas transmission facilities by Class location

Class	Normal Soil Minimum Cover (Inches)	Consolidated Rock Minimum Cover (Inches)
1	30	18
2	36	24
3	36	24
4	36	24

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B. Notes on Minimum cover for buried gas transmission facilities:

- (1) Where an underground structure prevents the installation of a transmission line with the minimum cover, the transmission line may be installed with less cover per the requirements stated in 49 CFR 192.327, and Utility Procedure TD-4813P-01.
 - a) Before installing transmission line at less than minimum cover, responsible engineer must document in an approved project management tool the underground structure, the additional protection being used, and the rationalization or any calculations done to show the additional protection was sufficient.
- (2) All pipe installed in a navigable river, stream, or harbor must be installed with a minimum cover of 48" in soil or 24" in consolidated rock between the top of the pipe and the underwater natural bottom (as determined by recognized and generally accepted practices).
- (3) In areas where grading or erosion are anticipated or farming or other operations which might result in deep plowing could occur, a minimum of 42" of cover must be provided over buried transmission lines. Deep plowing is plowing at depths greater than 8".
- (4) In areas where subsoiling activity is anticipated, a minimum of 48" of cover must be provided. Subsoiling is plowing or turning up the subsoil. If there are indications of any other activity that would adversely affect a pipeline installed with the cover specified or that could reduce the cover in the future, additional cover must be provided as appropriate.
- (5) Minimum cover for a transmission line in or crossing drainage ditches of public roads and railroad crossings must be 36", except where greater depths are required by Interim Standard 463-3.

2. Gas Distribution Main Facilities

A. Minimum cover for buried gas distribution main facilities are specified in Table 2.

Table 2. Minimum Cover for Gas Distribution Main Facilities by Location

Location	Minimum Cover (Inches)
Streets and Roads not designated as State Highways and Freeways, Private rights-of-way, Sidewalks, Private Property	24
Crossing of state highways and freeways	See GDS A-70
Joint Trench	For all joint trench requirements, see Utility Standard S5453, "Joint Trench".

B. Notes on Minimum cover for buried gas distribution main facilities:

- (1) Where an underground structure prevents the installation of a main with the minimum cover, the main may be installed with less cover per the requirements stated in 49 CFR 192.327. When installing under these conditions, local engineer to document reason for cover on job drawings.
- (2) In areas where grading or erosion are anticipated or farming or other operations which might result in deep plowing could occur, a minimum of 42" of cover must be provided over mains. Deep plowing is plowing at depths greater than 8". In areas where subsoiling activity is anticipated, a minimum of 48" of cover must be provided. Subsoiling is plowing or turning up the subsoil.
- (3) All pipe installed in a navigable river, stream, or harbor must be installed with a minimum cover of 48" in soil or 24" in consolidated rock between the top of the pipe and the underwater natural bottom (as determined by recognized and generally accepted practices).
- (4) Sufficient additional cover must be provided for the main to permit 24" of cover for services tapped off the main.
- (5) INSERTS: Where an existing main is replaced by insertion, the pipe used as a casing must have a minimum of 24" of cover.
- (6) Where a main being replaced by insertion does not have the required cover except where the main is subject to the conditions of Interim Standard 463-3, the local senior engineer must determine whether the existing pipe can provide the additional protection from anticipated external loads, as required by 49 CFR 192.327.
- (7) Note that cover requirements in Utility Standard S5453 apply to proposed joint trenches. Installations that are adjacent to a joint trench but are not in the joint trench do not follow joint trench requirements in Utility Standard S5453.

3. Service Lines

- A. Minimum cover for buried gas service lines are specified in Table 3.

Table 3. Minimum cover for Gas Services by Location

Location	Minimum Cover (Inches)
Gas Only Trench	24
Joint Trench	For minimum cover, see Utility Standard S5453.

B. Notes on Minimum cover for buried gas service lines:

- (1) Where a plastic or steel service is to be installed off an existing main which has 24" of cover or less, the service must be installed so that the section of pipe with less than 24" cover must be kept to a minimum. Cover over the service pipe under this condition must never be less than 18", unless special protection is provided.
- (2) Where an underground structure or other impeding condition prevents the installation of a service with the minimum cover shown in Table 3, then the local engineer may install the service with a minimum cover of 18". When installing at 18", local engineer to document reason on job drawings.
- (3) At the riser, the section of pipe which has 24" of cover or less must be kept to a minimum. This is accomplished by specifying:
 - a) IF the ground is level near the gas service riser,

THEN use a standard riser and use dirt or sand to taper-up the slope with the servicing tubing, as close as practical to the riser. Adjusting the trench depth just prior to the riser is preferred over field bending the riser for standard installations.
 - b) IF the ground slopes downward from the gas service riser,

THEN use a standard riser. The riser can be bent in the field to adjust to the slope.
 - c) 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.
- (4) Services Inserts: Where an existing service is replaced by insertion, the pipe used as a casing must have a minimum of 18" of cover. Where a service being replaced by insertion does not have the required cover except where the service is subject to the conditions of Interim Standard 463-3, the local senior engineer must determine whether the existing pipe can provide the additional protection from anticipated external loads, as required by 49 CFR 192.327.
- (5) Note that cover requirements in Utility Standard S5453 apply to proposed joint trenches. Installations that are adjacent to a joint trench but are not in the joint trench do not follow joint trench requirements.

4. Notes on Cover that apply to all facilities

A. Exceptional Cases: Contact the appropriate responsible gas engineering personnel to determine any additional appropriate cover requirements in the following cases:

- If there are indications of any other activity that would adversely affect a pipeline installed with the cover specified or that could reduce the cover in the future,
- Where the additional cover requirement involves a substantial additional cost to the Company, notify the appropriate responsible gas engineering personnel.
- Where consolidated rock soil conditions are encountered which make it not feasible to provide the cover specified above.

B. Mitigations:

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

C. Additional Considerations: Additional cover should be provided where the potential for damage by outside forces is greater than normal. Consideration should be given to the following:

- Agricultural land where the grade may be changed to permit irrigation or drainage.
- Other utility crossings. The new gas facilities should be installed under the existing facilities, unless adequate cover can be provided or casing, bridging, or other protection is used.
- Locations where erosion due to wind, water, or vehicular activity may affect the grade. Riprap, paving, or some other means of protection may be used in lieu of additional cover.
- Street locations where future street work is a possibility.
- Locations where frost, drought, and heat might affect the pipeline.

Clearance Requirements

1. Joint Trench Requirements:

- A. For joint trenches, clearances are specified in Utility Standard S5453.
- B. Crossing Clearances from primary and secondary electric facilities as specified in Utility Standard S5453 Attachment 1 - "Detailed Procedures." For installations near primary electric lines, provide a minimum radial separation of 12". For installations near secondary electric lines, provide a minimum radial separation of 6".

C. Follow Utility Standard S5453 Exhibit B - "Joint Trench Configurations and Occupancy Guide" for wet utility clearances.

2. Gas Transmission Lines:

A. Minimum clearance between transmission lines and any other underground structure must be minimum 12".

B. Adequate measures are undertaken to prevent contact between the pipeline and the underground structure, such as encasement of the pipeline with concrete, polyethylene or vulcanized elastomer, or the installation of sand-cement bags, concrete pads or open-cell polyurethane pads in the space between the pipeline and the underground structure.

C. See Clearance Requirements Section 3.C. below.

D. Clearance Requirements for Buildings

(1) In all cases that allow, install all new transmission lines a minimum horizontal clearance of at least 10 feet from the face (or foundation) of any building. This distance reduces the risk of stresses caused by external building loads due to the transmission line being installed within 10 feet of the face (or foundation) of any building.

a) In cases that do not allow a minimum horizontal clearance of at least 10 feet from the face (or foundation) of any building, the responsible gas engineer must review and approve.

b) When installing a transmission line less than 10 feet from the face of a building, consider the following design options. Note that these are considerations only: Each transmission line that is being installed less than 10 feet from the face of a building must be individually reviewed and approved.

- Consider installing the pipeline in casing next to the building.
- Consider posting pipeline markers at either end of the building to warn excavators of the presence of a pipeline.
- Consider future Grade 1 leak repair access.
- Consider stresses caused by proximity of building foundation.
- Consider length of service off of the main for EFV installation.
- Ensure warning tape is installed per GDS L-16.

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3. Gas Distribution Mains and Services:

- A. For independently installed buried distribution main and service lines (not in a joint trench), minimum clearances are specified in Table 4.

Table 4. Minimum Clearance for Gas Distribution Mains and Service Lines by Facility Type

Facility	Minimum Parallel Clearance	Minimum Crossing Clearance
Electric primary supply systems	12 inches ¹	
Electrical secondary supply systems and communication systems	12 inches	6 inches
Government- or utility-owned water or sewer facilities, drain or leach lines, or agriculture irrigation	3 feet ²	6 inches
Diesel or other volatile liquids; propane or other volatile, heavier-than-air gases	3 feet	6 inches
Steam lines from plastic PG&E gas pipelines	10 feet ³	
Any other heat source from plastic PG&E gas pipelines	Contact responsible engineer	
Any other pipe systems or other foreign substructures not listed above	12 inches	6 inches

- The minimum clearances can increase depending on the size of the electrical facility. The appropriate responsible gas engineering personnel must be consulted.
- For services only: if the 3-foot parallel clearance cannot be maintained, the clearance can be reduced to 12 inches. If 12 inches of clearance cannot be maintained, the service must be inserted in an existing facility or casing. The house side of the casing must be sealed per GDS A-73, "Casing Insulator and End Seals Selection Chart."
- Refer to GDS A-93, "Polyethylene Pipe Specifications and Design Considerations," if 10 feet cannot be met.

- B. Where an underground structure prevents the installation of a distribution main or service line with the minimum clearance shown in Table 4, the responsible engineer may approve installing the distribution main or service line with less clearance.

(1) When installing with less clearance, document reason for less clearance, mitigation methods used to protect the distribution main or service line, and responsible engineer approval in approved project management tool.

- C. When installing plastic pipelines by trenchless excavation, design sufficient clearance for installation and maintenance activities from other underground utilities and structures at the time of installation.

(1) Install per Utility Manual TD-4135M, "Horizontal Direction Drilling Manual," and Utility Manual TD-4170M, "Gas Transmission and Distribution Manual: Plastic Volume."

- D. The following possible activities should be considered when determining the clearance to be attained between the main being installed and other underground structures.
- Installation and operation of maintenance and emergency control devices, such as leak clamps, pressure control fittings, and squeeze-off equipment.
 - Connection of service laterals to both the main and other underground structures.
 - For additional methods of protection in lieu of sufficient clearance, see Section 2.B above.
- E. Each main must be installed with enough clearance from any other underground structure to allow proper maintenance and to protect against damage that might result from proximity to other structures.
- F. Install all new distribution mains a minimum horizontal clearance of at least 5 feet from the face (or foundation) of any building.
- (1) In cases that do not allow a minimum horizontal clearance of at least 5 feet from the face (or foundation) of any building, the responsible gas engineer must review and approve. When installing a distribution main less than 5 feet from the face of a building, consider the design options listed in Step 2.D above.
- G. In addition to meeting the requirements above, each plastic main must be installed with sufficient clearance, or must be insulated, from any source of heat so as to prevent the heat from impairing the serviceability of the pipe.
4. In all cases that allow, install all new services at a minimum parallel horizontal clearance that is equal to or greater than the buried depth of the service from the face (or foundation) of any building. For example, if the service is at a depth of 24", then the service must be at least 24" from the face of the foundation when parallel.
5. Each pipe-type or bottle-type holder must be installed with a minimum clearance from any other holder as prescribed in 49 CFR 192.175(b), "Pipe-type and bottle-type holders."
6. Third Party encroachment requirements:
- A. A Minimum of 12" undisturbed soil clearance applies to any non-utility facilities installed by a third party encroaching on Company rights-of-way or property. Where proper clearance cannot be attained as specified, other suitable precautions must be taken to protect the pipe, such as the installation of additional insulating material, bridging, or casing.

Records

1. Retain records per the Record Retention Schedule.

Target Audience

Gas estimating, gas distribution engineering and design, gas construction, gas transmission engineering and design, land department

Definitions

See Utility Standard TD-4125S, " Maximum Allowable Operating Pressure Requirements," for the definitions of transmission line, distribution main, and service line.

Pipeline: A pipeline that transports gas from a common source of supply to a customer meter set.

Acronyms and Abbreviations

CFR: Code of Federal Regulations

GDS: Gas Design Standard

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, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.3, "Definitions"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.175(b), "Pipe-type and bottle-type holders"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.325, "Underground clearance"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.327, "Cover"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.329, "Installation of plastic pipelines by trenchless excavation"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.361, "Service lines: Installation"

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.376, "Installation of plastic service lines by trenchless excavation"

California Public Utilities Commission (CPUC) General Order (GO) 112-F

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

GDS A-70, "Casings for Highway and Railroad Crossings"

GDS E-35.9, "Coating Protection Systems for Harsh Backfill Environments"

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

I.S. 463-3, "Gas Pipe Crossing of State Highways and Freeways"

S5453, "Joint Trench"

S55453 Attachment 1, "Detailed Procedures"

S5453 Exhibit B, "Joint Trench Configurations and Occupancy Guide"

TD-4813P-01, "Gas Transmission Pipelines Reduced Cover Evaluation"

Appendices

NA

Attachments

NA

Revision Notes

Revision 0d has the following changes:

1. New step General Information 5. to provide guidance for existing installations on appropriate minimum distance or protection between gas transmission and distribution assets and metallic structures or protection of existing installations when observed (CAPn issue 120472529 CA-1)
2. Added reference to definitions in TD-4125S.
3. Removed definitions of gas distribution main and transmission line.

Revision 0c has the following changes:

1. For transmission clearances, replaced reference to building clearances in distribution section with existing content.
2. For distribution clearances, replaced reference to Utility Standard S5453 for minimum clearances with Table 4, and moved clearances between plastic pipe and source of heat from existing step to Table 4. Added approval process if minimum clearances not practical, and updated minimum clearances from face (or foundation) of a building.

Revision 0b has the following changes:

4. Updated reference to CPUC GO 112-F.
5. Added process for transmission lines to be installed with less cover if it is provided with additional protection to withstand anticipated external loads.
6. Clarified main and service insert minimum cover requirements and process for if existing pipe used as a casing can provide adequate protection from anticipated external loads.
7. Added directions for when the standard riser depth does not meet the “at a minimum” requirements (CAPN 115523642).
8. Clarified that clearances from underground structures and underground utilities in the joint trench standard and apply to independently installed distribution main and services.
9. Added requirements for plastic pipelines installed by trenchless excavation (ECTS 508688)
10. To align with the transmission line definition change, plastic pipe requirements apply to transmission lines as well.

Revision 0a has the following changes:

1. Added section Records.

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Revision 0 has the following changes:

1. Converted document from Utility Standard S463-4 to Gas Standard and Specifications (Gas Design Standard).
2. Converted document from Utility Standard S463-4 to Gas Standard and Specifications (Gas Design Standard).
3. Converted the term "standard" to "Gas Design Standard" where appropriate. 4. Added items to cover 49 CFR 192.325, 49 CFR 192.327, 49 CFR 192.361.
4. Clarified cover requirements for Gas Mains and Gas Services.
5. Added clearance requirements for buildings.
6. This design standard is part of Change 67.

Asset Type: Gas Transmission and Distribution

Function: Design

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