



Internal Corrosion Control: Design Review

SUMMARY

This utility procedure provides the internal corrosion control design review process for Pacific Gas and Electric Company (Company) new or modified gas transmission, gathering, and storage lines or line components.

Level of Use: Information Use

TARGET AUDIENCE

Personnel responsible for submitting and reviewing design drawings for internal corrosion control review.

SAFETY

Compliance with this procedure reduces the risk of internal corrosion in transmission, gathering, and storage lines, which results in increased public and personnel safety. No specific safety concerns are associated with the use of this procedure by a user performing the internal corrosion control design review.

BEFORE YOU START

Corrosion personnel performing the internal corrosion design review must receive training from the appropriate subject matter expert (SME) corrosion engineer.

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1	General	2
2	Internal Corrosion Control Design Review Submittal Process	2
3	Internal Corrosion Control Design Review Steps	4
4	Records.....	7



Internal Corrosion Control: Design Review

PROCEDURE STEPS

1 General

1.1 Project owner or designee submits the following design drawings to corrosion services for internal corrosion control review:

- New transmission, gathering, or storage lines
- Replacement of existing transmission, gathering, or storage line piping, valves, fittings, or other line components

1.2 Corrosion services performs an internal corrosion control design review of the above designs to ensure compliance with the requirements of Gas Utility Standard TD-4186S, "Internal Corrosion Control of Gas Facilities." (49 CFR 192.476).

2 Internal Corrosion Control Design Review Submittal Process

2.1 Project owner or designee is responsible for:

1. Identifying the corrosion engineer or designee responsible for the area with the new or modified design. Refer to corrosion engineering areas of responsibility map.
2. Submitting drawings to the appropriate corrosion engineer or designee for review.

2.2 General Considerations

- Provide 2 weeks for the design review where possible.
- Submit drawings between the 60-80% design stages to allow for design modifications.
- IF required,
THEN resubmit modified drawings to the corrosion engineer for final review.

2.3 Submittal Methods

Submit the job package using one of the methods below:

1. Electronic Document Routing Request (EDRS) is the preferred method.
 - a. Submit an EDRS review request to the responsible corrosion engineer or designee.



Internal Corrosion Control: Design Review

2.3.1 (continued)

- b. At a minimum, include the following :
 - (1) Document title (project name).
 - (2) Job order number.
 - (3) Piping plan drawings.
 - (4) Gas Utility Form TD-4186P-200-F01, "Internal Corrosion Control Design Review Checklist for Transmission, Gathering, and Storage Lines," with the Project Information Section completed.
- c. Allow 10 business days for the internal corrosion control review. The corrosion engineer or designee reviews the drawings as described in Section 3.
- d. After the review is complete and requested changes are made and approved, complete one of the following:
 - Print a hard copy of the final drawings for the corrosion engineer's or designee's signature on the Internal Corrosion Review Stamp.
 - Print the EDRS approval page and attach to the job package. "Approved via EDRS" can be printed in the appropriate Internal Corrosion Review Stamp box.

2. Hard-Copy or Digital (non-EDRS) Review

- a. Print or email a full set of the piping plan drawings for review by the responsible corrosion engineer or designee.
- b. Attach Gas Utility Form TD-4186P-200-F01, "Internal Corrosion Control Design Review Checklist for Transmission, Gathering, and Storage Lines," with the Project Information Section completed.
- c. Allow 10 business days for the internal corrosion control review. The corrosion engineer or designee will review the drawings as described in Section 3.
- d. After the review is complete and requested changes are made and approved, print a hard copy of the final piping plan drawings for the corrosion engineer's or designee's signature on the Internal Corrosion Review Stamp.

Internal Corrosion Control: Design Review

3 Internal Corrosion Control Design Review Steps

3.1 Corrosion engineer or designee performing the internal corrosion control review is responsible for the following:

1. Record the completion of each applicable step on Gas Utility Form TD-4186P-200-F01, "Internal Corrosion Control Design Review Checklist for Transmission, Gathering, and Storage Lines."
2. Consider the questions below:
 - a. Is the design for a new transmission, gathering, or storage line, or a replacement of line pipe, valve, fitting, or other line component in an existing transmission, gathering, or storage line?
 - b. Has the configuration of the transmission, gathering, or storage line been changed?

3.2 IF the answer to both question 3.1.2.a. and 3.1.2.b. is NO,
THEN an internal corrosion design review is not required and no further action is needed.

3.3 IF the answer to either question 3.1.2.a. or 3.1.2.b. is YES,
THEN proceed to Section 3.4 below to perform the internal corrosion control design review.

3.4 IF an internal corrosion control design review is required,
THEN the corrosion engineer or designee performing the review completes the following steps.

1. Review for Current Assigned Internal Corrosion Threats

For new or modified transmission, gathering, or storage line designs, check for current assigned internal corrosion threats through a source such as the GIS database. Check for current assigned threats to any segments of the line in question and to source pipelines.

- a. IF a current internal corrosion threat is assigned
THEN contact the appropriate SME corrosion engineer for assistance AND continue performing the steps in this section.
- b. IF a current internal corrosion threat is not assigned,
THEN proceed to and complete Section 3.4.5 and Section 3.4.6.a. After completing Section 3.4.6.a, proceed to Section 4.



Internal Corrosion Control: Design Review

3.4 (continued)

2. Review Integrity Management Data

For modified transmission, gathering, or storage line designs with an assigned internal corrosion threat, review data collected by the Integrity Management group, including the following where applicable:

- External corrosion direct assessment (ECDA) data including pre-assessment forms and existing local personnel interviews
- Internal corrosion direct assessment (ICDA) data
- In-line inspection (ILI) data

3. Review A-Forms

For new or modified transmission, gathering, or storage line designs with an assigned internal corrosion threat, review A-Forms for internal corrosion indications.

- a. Review leak and inspection A-Forms for the entire line including source pipelines, ideally back to the gas source.
- b. Note indications of internal rust, internal pitting, and leaks due to internal corrosion.

4. Review Liquid Sample Database

For new or modified transmission, gathering, or storage line designs with an assigned internal corrosion threat, review the liquid sample database.

- a. Review the liquid sample database for the line and source lines.
- b. Note amount of liquids pulled and corrosive content.

5. Review Drip Locations

For modified transmission, gathering, or storage lines, review drips that will be added, removed, or replaced.

- a. Determine whether any drips will be affected by the project, such as removing drips for hydro testing or in-line inspection (ILI) upgrades.
- b. Check detail drawings for drip removals. Consult with the appropriate SME corrosion engineer if drips will be added or replaced.
- c. Check corrosion services drip database for drips in the vicinity of the project. Update the drip database if drips are added, removed, or replaced.



Internal Corrosion Control: Design Review

3.4 (continued)

6. Review Construction Drawings

- a. For new or modified transmission, gathering, or storage line designs, review the proposed piping plan and elevation profile for dead legs, stubs, or low spots in the pipe. Avoid designing these features where possible.

- IF dead legs, stubs, or low spots cannot be removed,

THEN consider these locations as potential installation sites for internal corrosion monitoring devices.

- b. IF practical or necessary,

THEN perform the detailed review below:

- (1) Has the design considered the risk of liquids collecting in the line and been configured accordingly to reduce that risk?

- Have low points been minimized?
- Have the number of dead legs been reduced or eliminated?
- IF a low spot cannot be avoided,

THEN has the design been modified so that the piping configuration at the low spot is under the calculated critical angle as described in Risk Management Procedure, RMP-10?

- (2) Have means been included to remove liquids such as:

- Separation vessels
- Dehydration or dewatering units
- Drips
- Other

- (3) At locations with significant potential for internal corrosion, has the use of monitoring devices been considered as described in Gas Utility Procedure TD-4186P-300, "Internal Corrosion Control: Corrosion Rate Monitoring?" (CFR 192.476(a)(3))



Internal Corrosion Control: Design Review

3.4.6.b (continued)

- (4) IF the configuration of a transmission, gathering, or storage line has changed,

THEN has the impact of the change on internal corrosion risk to the downstream portion of an existing line been evaluated and liquid removal and internal corrosion monitoring been provided as appropriate? (CFR 192.476(c))

- c. IF the answer to any of the above questions in Section 3.4.6.b is NO,

THEN modify the design to reduce the risk of internal corrosion or provide written justification for negative responses on Gas Utility Form TD-4186P-200-F01, "Internal Corrosion Control Design Review Checklist for Transmission, Gathering, and Storage Lines."

4 Records

4.1 Project owner ensures the following:

1. Attach completed Gas Utility Form TD-4186P-200-F01, "Internal Corrosion Control Design Review Checklist for Transmission, Gathering, and Storage Lines," to the reviewed job.
2. Corrosion engineer completes Internal Corrosion Review Stamp applied to the transmission, gathering, or storage line construction drawing per Gas Utility Standard TD-4186S, "Internal Corrosion Control of Gas Facilities."

END of Instructions



Internal Corrosion Control: Design Review

DEFINITIONS

In-Line Inspection (ILI): The inspection of a pipeline from the interior of the pipeline using an electronic instrument or tool. The tools used to conduct ILI are known as pigs, smart pigs, or intelligent pigs.

Separation Vessels: Also designated as filter/separators are vessels designed in a pipeline system to remove liquids and debris from the gas stream.

Additional definitions are listed in Gas Utility Standard TD-4186S, "Internal Corrosion Control of Gas Facilities."

IMPLEMENTATION RESPONSIBILITIES

Corrosion services ensures all impacted personnel are aware of this procedure.

Supervisors communicate this procedure to personnel responsible for submitting and reviewing design drawings for internal corrosion control review and ensure that personnel are trained to perform these tasks.

GOVERNING DOCUMENT

Gas Utility Standard TD-4186S, "Internal Corrosion Control of Gas Facilities"

COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

49 CFR 192.475 "Internal corrosion control: General"

49 CFR 192.476 "Internal corrosion control: Design and construction of transmission line"

49 CFR 192.477 "Internal corrosion control: Monitoring"

49 CFR 192.491 "Corrosion control records"

REFERENCE DOCUMENTS

Developmental References:

NACE SP0106-2006, "Control of Internal Corrosion in Steel Pipelines and Piping Systems"

Supplemental References:

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

Gas Design Standard A-05, "Piggable Pipeline"

APPENDICES

NA



Internal Corrosion Control: Design Review

ATTACHMENTS

NA

FORMS

Gas Utility Form TD-4186P-200-F01, "Internal Corrosion Control Design Review Checklist for Transmission, Gathering, and Storage Lines"

DOCUMENT REVISION

Gas Design Standard O-16, "Corrosion Control of Gas Facilities" is being replaced by the following document set:

- Gas Utility Standard TD-4180S, "General Corrosion Control of Gas Facilities"
- Gas Utility Standard TD-4181S, "External Corrosion Control of Gas Facilities"
- Gas Utility Standard TD-4186S, "Internal Corrosion Control of Gas Facilities"
- Gas Utility Standard TD-4188S, "Atmospheric Corrosion Control of Gas Facilities"
- Gas Utility Procedure TD-4181P-101, "Cathodic Protection Area (CPA) Design and Modification"
- Gas Utility Procedure TD-4181P-201, "Cathodic Protection Monitoring and Restoration"
- Gas Utility Procedure TD-4181P-202, "Cathodic Overprotection"
- Gas Utility Procedure TD-4181P-301, "Rectifier Maintenance and Adjustment"
- Gas Utility Procedure TD-4186P-100, "Internal Corrosion Control: Liquid and Solid Sampling and Testing"
- Gas Utility Procedure TD-4186P-200, "Internal Corrosion Control: Design Review"
- Gas Utility Procedure TD-4186P-300, "Internal Corrosion Control: Corrosion Rate Monitoring"
- Gas Utility Procedure TD-4186P-400, "Internal Corrosion Control: Mitigation"
- Gas Utility Procedure TD-4186P-500, "Internal Corrosion Control: Annual Program Review"



Internal Corrosion Control: Design Review

DOCUMENT APPROVER

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REVISION NOTES

Where?	What Changed?
All	<p>This is a new utility procedure, part of the document set replacing the internal corrosion control requirements portion of Gas Design Standard O-16, "Corrosion Control of Gas Facilities."</p> <p>O-16 is being updated and rewritten to comply with the new Company guidance document requirements, and is being reorganized and expanded into the following four standards with multiple procedures under each standard:</p> <ul style="list-style-type: none"> • General Corrosion Control • External Corrosion Control • Internal Corrosion Control • Atmospheric Corrosion Control <p>See the Guidance Document Analysis for details.</p>