


Prepared by: [REDACTED]

		WELD INSPECTION		D-40
Department:	Gas System Maintenance and Technical Support	Section:	System Integrity	Date: 11-10-99
Approved by:	[REDACTED]	Approved by:	S. Y. Chwistek	
Rev. #00: This document replaces PG&E Drawing 086574. For a description of the changes, see Page 3.				

Purpose and Scope

This gas standard describes how often visual and radiographic inspections need to be made on welds, who can act as an inspector and how inspection records are to be documented and maintained.

More frequent radiographic or visual inspections may be performed at the direction of the job supervisor if, in the supervisor's judgment, they are necessary to ensure the quality of the welding. When determining the need to inspect the welds more frequently, consider the stress level at which the system will operate, and the type and location of the facility.

Acronyms

- API: American Petroleum Institute
- DP: Design Pressure
- FDP: Future Design Pressure
- MAOP: maximum allowable operating pressure
- psig: pounds per square inches gauge
- SMYS: specified minimum yield strength

References

Document

- Arc Welding Procedure Requirement – All Stress Levels Gas Standard D-22
- Standards of Acceptability for Welding Nondestructive and Destructive Testing Gas Standard D-31
- Standard for Welding Pipelines and Related Facilities API 1104

Radiographic Inspection

1. Radiographic inspection applies to facilities with a MAOP DP or FDP that corresponds to 20% or more of SMYS and to gas lines that are located on bridges and have a MAOP of 200 psig or more.
2. Check weld quality using nondestructive examination. The following percentages of each day's field welds, selected at random by the operator, must be examined radiographically around the entire circumference.
 - A. Welds made at Class 1 and 2 locations: radiograph at least 20% of the welds.
 - B. Welds made at Class 3 and 4 locations and at crossings located at major or navigable rivers: radiograph 100% of the welds, if practicable, but not less than 90% of the welds.
 - C. Welds with repaired areas: radiograph 100% of the welds.
 - D. For all station work, pipeline tie-ins, and welds within railroad or public highway rights-of-way (including tunnels, bridges and overhead road crossings): radiograph 100% of the welds.
3. Visually inspect a minimum of 20% of the welds which are not radiographed, as outlined in the "Visual Inspection" section of this standard.
4. Under the following conditions, the welds may be visually examined instead of radiographically examined.
 - A. The pipe has a nominal diameter of less than 6", regardless of stress level, or
 - B. The pipeline operates at a pressure under 40% of SMYS and the welds are so limited that radiographic testing is impractical.

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5. Ensure that a sample of each welder's work is radiographically inspected each day except for welders whose work is isolated from the principal welding activity.
6. A qualified radiographer must perform all radiographic inspections. The minimum requirements for a qualified radiographer are specified in the American Society for Non-Destructive Testing Recommended Practice SNT-TC-1A. Look in the section that refers to Level 2 radiographers.

Visual Inspection

7. Visual inspection requirements apply to all welding, both arc and oxy-acetylene, regardless of the pipe's stress level. It is not necessary that every weld be visually inspected; however, the inspections should be conducted at reasonably frequent intervals to ensure high-quality workmanship. The job supervisor should determine the frequency of welding inspections based on the type and location of the facility involved, and the experience of the welders. As a rule, the job supervisor should follow the guidelines listed below to determine the number of daily visual inspections.
 - A. Inspect a minimum of 20% of the welds on pipeline facilities designed to operate at 20% or more of SMYS, which are not to be radiographically inspected as outlined in the previous "Radiographic Inspection" section.
 - B. Inspect a minimum of 20% of the welds on pipeline facilities designed to operate at less than 20% of SMYS.
8. Visually inspect any additional welds if there is any reason to question the work of a welder or if, for any other reason, it becomes necessary to ensure the quality of the welding.
9. Where practicable, the inspection should include work by each of the welders on the job.
10. Visual inspections shall verify the following information.
 - A. The welding is performed in accordance with the welding procedure.
 - B. The joints are properly aligned before welding with minimum high-low.
 - C. Burn-through and inadequate stringer bead penetration do not exceed the limits stated in Gas Standard D-31.
 - D. Undercutting adjacent to the cover pass does not exceed the limits stated in Gas Standard D-31.
 - E. The weld is free of cracks and other defects.
 - F. The dimensions of the finished weld complies with Gas Standard D-22.
 - G. The weld presents a neat, professional appearance.
11. An inspector is not required to be present during the entire welding process. A spot check conducted at some point during the welding process or a spot check conducted on a finished weld qualifies as an inspection. However, an inspector should check each of the items mentioned in 10.A. through 10.G. frequently enough to ensure that the welding standards are being met.
12. An experienced welder or former welder must perform visual inspections. The supervisor designating the inspector is responsible to determine if the person is qualified. As a minimum, the supervisor must ensure that the inspector has read and understands the "Weld Inspection Guide" in the *Gas Foreman's Manual* (Section 2).

Records

13. Supervisors must maintain a record of all visual inspections made at facilities operating at less than 20% of SMYS. A valid record is a Work Order, service record or other record document stamped with the following information.

Welding Inspected Per PG&E Gas Standard D-40 by _____ Inspector

14. Supervisors must also document all radiographic inspections, as outlined in the "Radiographic Inspection" section by completing forms 75-53 and 75-307, which are included in this gas standard. All records shall be retained for the life of the facility where the weld was performed.

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Revision Notes

Revision 00 has the following changes.

1. Converted PG&E Drawing 086574 to Gas Standard D-40.
2. Added an "Acronyms" section and a "References" section.
3. Deleted former "Visual Inspection," Note 4.4.4 text.
4. This document is part of Change 46.

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Attachment A

Nondestructive Testing of Welds on Facilities Designed to Operate at 20% or More of S.M.Y.S. and Piping Systems Located on Bridges and Operating at a Pressure Exceeding 200 PSIG
Job Summary



Technical & Construction Services (T&CS)
75-307, Rev. 10/93

Date _____

GM/WO No. _____ Region _____ Division _____

Job Description _____

Location - (City or Town) _____

Class Location ¹ _____ (Percent of weld requiring inspection) _____

Design Pressure _____

Pipe Size _____ O.D. Wall Thickness _____ Pipe Specification _____

Location of pipeline in relation to pipeline mile-posts, engineering stations or by geographic features:

From: _____

To: _____

Total no. of field girth welds in pipeline: _____

Total no. of field girth welds nondestructively tested: _____

Total no. of field girth welds rejected: _____

Disposition of the rejects No of Cut-outs: _____

No of Repairs: _____

Percent of field girth welds nondestructively tested: _____

Radiographic Inspector: _____

Distribution:

Region Gas Mgr
Div. Gas Mgr.
GC Gas - S.F.
Job file

Construction
Supervisor or
General Foreman _____

¹ Use separate sheet for each change of class location

Weld Inspection

Attachment B

D-40



Inspection Report of Welds on Piping Systems Intended to Operate at 20% or More of Specified Minimum Yield Strength

Technical & Construction Services (T&CS)
75-307, Rev. 10/93

GM/WO No. _____ Region _____ Division _____ Date _____

Job Description: _____

Welders: _____

Inspected by: Visual _____ Radiographic _____

Standard of acceptability of welds on pipelines covered in this report shall be in accordance with Gas Std. D-31. Note all defects as they occur in the areas set forth below:

Weld No. or Location	Pipe			Sec. A 12-4 O'Clock	Section B 4-8 O'Clock	Section C 8-12 O'Clock	Type of Inspection		Passed	Failed	Remarks
	Type 2	Pipe Dia.	Wall Thick.				Visual	Radio.			

- ¹ Weld defects abbreviations:
 - Crack (Cr) Lack of Penetration (Lp)
 - Burn Through (Bt) Slag Inclusion (Si)
 - Gas Pockets (Gp) Wagon Tracks (Wt.)
 - Lack of Fusion (Lf) Undercut (Uc)

- ² Nomenclature (for Type Weld)
 - B - Butt weld
 - F - Fillet Weld
 - S - Sleeve
 - SF - Sleeve Fillet Weld)

- Distribution:
1. Region Gas Managers
 2. Div. Gas Supt. (or P.L.O. Area Supt.)
 3. G.C. Office, SF., for permanent filing
(Incl. Foreman's copy of the W.O. or GM)