


Prepared by: [REDACTED]

 WELD INSPECTION D-40	
Department: Gas System Maintenance and Technical Support Approved by: B. D. Davis	Section: System Integrity Date: 12-06-01 Approved by: [REDACTED]
Rev. #01: This document replaces Revision #00. For a description of the changes, see Page 3.	

This document also appears in the following manuals.

- *Gas Applicant Design Manual*

Purpose and Scope

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

More frequent radiographic or magnetic particle inspections may be performed at the discretion 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
- TDW: T. D. Williamson (manufacturer)

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. Use nondestructive examination to check the weld quality. 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 of each welder's daily work.
 - B. Welds made at Class 3 and 4 locations and at crossings located at major or navigable rivers: radiograph 100% of the welds, unless impracticable, in which case radiograph at least 90% of the welds. Non-destructive testing must be impracticable for each girth weld not tested.
 - 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.
 - E. All tie-in and pressure-retaining repair sleeves, including TDW and Mueller pressure-control fittings: radiograph 100% of the welds.
3. Visually inspect 100% of the welds, as outlined in the “Visual Inspection” section of this standard.

Weld Inspection

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.
5. Ensure that a sample of each welder's work is radiographically inspected each day. Welders whose work is isolated from the principal welding activity are exempted from this requirement.
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. Refer to the section covering Level 2 radiographers.

Magnetic-Particle Inspection

7. The following welds shall be examined using magnetic-particle examination:
 - A. All tie-in and pressure-retaining repair sleeves, including TDW and Mueller pressure-control fittings: only inspect fillet welds to carrier pipe.
 - B. Reinforcing sleeves (not pressure-retaining): inspect fillet welds to carrier pipe and any branch welds.
8. Under the following conditions, the welds may be visually examined instead of using magnetic-particle examination:
 - 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 magnetic-particle testing is impractical.
9. Procedures and acceptance criteria for magnetic-particle inspections shall conform to the requirements of API 1104.
10. A qualified, magnetic-particle inspector must perform all inspections. The inspector shall meet the minimum requirements for a Level 2, magnetic-particle inspector as specified in the American Society for Non-Destructive Testing, Recommended Practice SNT-TC-1A.

Visual Inspection

11. Visual inspection requirements apply to both arc and oxy-acetylene. All welds shall be visually inspected, regardless of the pipe's stress level.
12. 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 comply with Gas Standard D-22.
 - G. The weld presents a neat, professional appearance.
13. An inspector is not required to be present during the entire welding process. A spot check conducted at some point during the welding process and a final check on all welds qualifies as an inspection. However, an inspector should check each of the items mentioned in 12A through 12G frequently enough to ensure that the welding standards are being met.
14. An experienced welder or former welder must perform the visual inspections. The supervisor designating the inspector is responsible for determining 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

15. Supervisors must maintain a record of all visual and magnetic particle inspections made at facilities. A valid record is a work order, a service record, or an other record or document stamped with the following information.

Weld Inspection

Welding Inspected per PG&E Gas Standard D-40	
Visual	<input type="checkbox"/>
Magnetic Particle	<input type="checkbox"/>
Inspector _____	
Data _____	

16. Supervisors must also document all radiographic inspection reports and Job Summary, as outlined in Form 75-53 (Attachment A) on Page 4. All records shall be retained for the life of the facility where the weld was performed.

Revision Notes

Revision 01 has the following changes.

1. Added all tie-in and pressure-retaining repair sleeves to the list of the welds required to be inspected radiographically (Item 2E in the "Radiographic Inspection" section on Page 1).
2. Added the magnetic-particle inspection as another nondestructive method to check the weld quality. See new "Magnetic-Particle Inspection" section on Page 2.
3. Revised the visual inspection requirements from 20% to 100% of the welds.
4. Deleted Attachment B which was Form 75-307, Rev. 10/93, "Inspection Report of Welds on Piping Systems Intended to Operate at 20% or More of Specified Minimum Yield Strength."
5. This document is part of Change 50.

Weld Inspection

Attachment A

Nondestructive Testing of Welds on Facilities Designed to Operate at 20% or More of SMYS and Piping Systems Located on Bridges and Operating at a Pressure Exceeding 200 PSIG

Job Summary



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Date _____

GM/WO No. _____ Area _____

Job Description _____

Location – (City or Town) _____

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

Design Pressure _____

Pipe Size _____ OD Wall Thickness _____ Pipe Specification _____

Pipe Size _____ OD Wall Thickness _____ Pipe Specification _____

Pipe Size _____ OD Wall Thickness _____ Pipe Specification _____

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

From: _____

To: _____

Total number of field girth welds in pipeline: _____

Total number of field girth welds nondestructively tested: _____

Total number of field girth welds rejected: _____

Disposition of the rejects Number of Cut-outs: _____

Number of Repairs: _____

Percent of field girth welds nondestructively tested: _____

Radiographic Inspector: _____

Distribution: GSM&TS Project Engineer
 Construction Supervisor or Area Foreman _____
 Job file

¹ Use separate sheet for each change of class location.