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WELD INSPECTION

D-40

Department: Asset Investment Planning
Section: Gas Asset Strategy

Approved by: [redacted] Original Signed By
Date: 11-30-06

Rev. #02: This document replaces Revision #01. For a description of the changes, see Page 3.

This document also appears in the following manual:

- *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
Oxyacetylene Weld Procedure	Gas Standard D-20
Arc Welding Procedure Requirement – All Stress Levels	Gas Standard D-22
Standard 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 an 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 10% of the welds of each welder's daily work in Class 1 and at least 15% of the welds of each welder's daily work in Class 2.
   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 repaired area.
   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.
4. Under the following conditions, the welds may be visually examined instead of using radiographic 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 radiographic testing is impractical.
5. A sample of each welder's work for each day shall be inspected by radiography. 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. Only Level 2 or Level 3 personnel shall interpret results.

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 all welds made with either arc or oxyacetylene processes. 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 Standards D-22 or D-20.
    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. The inspector shall have the proper Operator Qualification, knowledge, and complete comprehension of the applicable gas standard and welding procedure.

Records

15. A record of all visual and magnetic particle inspections made at facilities shall be maintained in the job file. A valid record is a work order, a service record, or an other record or document stamped with the following information.

> **Welding Inspected per PG&E Gas Standard D-40**
>
> Visual . . . . . ❑
> Magnetic Particle . . . . . ❑
>
> Inspector _____
> Date _____

16. All nondestructive inspection report information shall be recorded on the Job Summary, as outlined in Form 75-53. All records shall be retained for the life of the facility in the job file.

Revision Notes

Revision 02 has the following changes:

1. Revised the title block to reflect changes in the department organization.
2. Revised Item 2A on Page 1 to correct percentages of welds to be radiographed in Class 1 and 2 locations.
3. Revised Item 2C on Page 1 to define if the entire weld or repaired area of the weld needed to be radiographed.
4. Revised Item 5 on Page 2 to mirror the CFR.
5. Defined in Item 6 on Page 2 as per API 1104 who shall interpret results of all radiographic inspections.
6. Revised Item 14 on Page 2 to define inspector's qualifications.
7. Deleted the supervisor as the responsible person for filing the correct documentation from Item 15 on Page 3.
8. Defined the required documentation to be kept in the job file in Item 16 on Page 3.
9. Removed Attachment A, "Nondestructive Testing of Welds" form, from this standard. This form (75-53) is now a standalone MS Word document.
10. This document is part of Change 59.