Prepared by: JZB1

WELDER QUALIFICATION FOR UNDER 20% OF SMYS

D-30

Department: Gas Distribution and Technical Services **Section:** Gas Engineering and Planning

Approved by: [redacted] Original Signed By **Date:** 09-15-05

Rev. #01: This document replaces Revision #00. For a description of the changes, see Page 6.

Purpose and Scope

This gas standard is used to determine the ability of the welder to make sound welds in order to maintain quality construction for all piping systems operating under 20% of SMYS.

Acronyms

API:	American Petroleum Institute
ASTM:	American Society for Testing and Materials
BOE:	beveled on one end
CFR:	*Code of Federal Regulations*
CGT:	California Gas Transmission
CSP:	*Code of Safe Practices*
EH:	extra heavy
GC:	General Construction
GD&TS, GFS:	Gas Distribution and Technical Services, Gas Field Support
L:	length
MAOP:	maximum allowable operating pressure
OD:	outside diameter
SMYS:	specified minimum yield strength
WT:	wall thickness

References

Document

Gas Standards and Specifications

Code of Safe Practices

Section 1: General Rules

Section 13: Gas Distribution and Transmission Systems

Welder Qualification for Under 20% of SMYS

References, continued — **Document**

Code of Federal Regulations

Qualification of Welders ..... 49 CFR 192.227

American Petroleum Institute

Qualification of Welders ..... 1104 Section 6

General Information

Welder qualification or requalification tests shall be made in accordance with the following procedures:

1. Employees shall pass a qualification test before being allowed to weld on pipe or fittings that are or will be a part of a natural gas piping system. Trainees who have successfully completed the Apprentice Fitter Primary Shop Training will only be allowed to perform welding on pipe sizes in which they have qualified until subsequent qualification testing of these welders complies with qualification test requirements in this standard.
2. Qualification and requalification tests shall be performed under the supervision of a qualified welding inspector. This inspector shall not leave the immediate area while qualification and requalification testing is being performed. For the purpose of this standard, a qualified welding inspector is a designated employee that has the experience and knowledge to judge the quality of welds (refer to Gas Standard D-40). The supervisor shall not designate a welding inspector without the prior approval of the GD&TS, GFS weld inspection and testing group. The inspector need not be present when the welder performs the weld for the 6-month verification test. The supervisor must verify that the test specimen was performed by the welder.
3. For employees who have previously qualified, requalifying tests shall be required as a result of any one of the following conditions:
   A. A period of 1 year plus or minus 1 month has elapsed since the previous qualification test. A welder must be requalified within the period from the month preceding to the month following his last annual anniversary requalification.
   B. A welder has not worked at the particular welding process for a period of 6 months or more.
   C. There is specific reason to question the ability of the welder to make sound welds.
   D. There is a change in the welding process from gas to shielded arc welding or vice versa, from one gas or one arc welding process to another gas or another arc welding process, or from manual to semi-automatic or automatic.
   E. There is a change in pipe material from ASTM or API Standard 5L and 5LX Grade X-42 groups to API Standard 5LX groups in excess of Grade X-42 and vice versa.
4. After testing the specimens in accordance with Gas Standard D-31, prepare the report forms (Forms FD-30-A and FD-30-B). For information on record retention, refer to “Records” section.

Table 1 Approved Products

Description		Size	Code
Test Spools	Oxyacetylene Qualification	4” Diameter x 4-1/2” x 0.156”/0.188” WT With 37-1/2° Bevels on Both Ends (API 5L Grade B/X-42)	022579
	Arc Welder Qualification	6” Diameter x 4-1/2” x 0.156”/0.188” WT With 37-1/2° Bevels on Both Ends (API 5L Grade B/X-42)	022580
Pipe Nipples		3/4” Diameter x 4-1/2” EH BOE	022578
Test Sleeve Assembly		4” Diameter x 9” L x 0.156”/0.188” WT With 3” L x 0.250” WT Sleeve	022059

Welder Qualification and Requalification Tests

5. Arc Welder Qualification
   A. The following tests are required for arc welder qualification:
      (1) Make a butt weld with 6” diameter x 4-1/2” minimum length spools (0.156”/0.188” WT recommended).

(2) Make a sleeve on 4" pipe (fillet welds), sleeve – 0.250" WT x 3" L, pipe – 0.156"/0.188" WT x 9" L.

(3) Make a branch connection, 3/4" x 4-1/2" L EH nipple on 2", 3", or 4" pipe.

B. A welder passing the tests specified in Item 5A above is qualified to arc weld pipe and fittings on all systems with a design pressure stress level of less than 20% SMYS and a diameter of 12" or smaller. See Gas Standard D-30.2 for qualification requirements for higher stress levels.

6. Oxyacetylene Welder Qualification

A. The following tests are required for oxyacetylene qualification:

(1) A butt weld with a 4" diameter x 4-1/2" minimum length spools (0.156"/0.188" WT recommended). 49 CFR 192 (latest revision) requires that three of four coupons pass root bend tests for qualification of welders on low stress level pipe. Perform a butt weld test on one end of the sleeve weld test specimen.

(2) A sleeve on 4" pipe. (Same as arc weld qualification.)

(3) A branch connection – 3/4" x 4-1/2" L EH nipple on 2", 3", or 4" pipe. (Same as arc weld qualification.)

B. A welder passing the test specified in Item 6A above is qualified to oxyacetylene weld pipe and fittings for 4" and smaller pipe, and service connections on 8" and smaller pipe for all systems with a design pressure stress level of less than 20% SMYS.

7. Test Weld Procedure

A. Arc welds are performed using the methods outlined in Gas Standard D-22. Oxyacetylene welds are performed using the methods outlined in Gas Standard D-20.

B. The butt welds and sleeve welds are made with the pipe in the horizontal fixed position. The branch connection is made with the header in the horizontal fixed position and the branch not more than 45° from the top of the header. For all test welds, no movement or rotation of the pipe is allowed during welding.

C. The oxyacetylene and arc welding of test assemblies shall not exceed 2 hours to complete.

8. Test Weld Inspection Requirements

A. All test welds shall be visually inspected. Sleeve welds require visual inspection only. Welds shall be free of cracks, inadequate penetration, unrepaired burn through (as applicable), and other defects. The weld bead and adjacent area shall present a neat, workman-like appearance. Arc burn due to striking an arc out of the weld groove is not allowed. Any weld not meeting these requirements shall be failed without performing any destructive tests.

B. Butt welds which pass the visual inspection shall be destructively tested. Take samples as shown in Figure 4 and Figure 5 on Page 5.

C. Four root bend samples are required. Three of the four samples must pass in order for the welder to qualify. Refer to Gas Standard D-31 for specimen tests and requirements.

D. A knock-off test shall be performed on branch connections which have passed the visual inspection.

9. A requalification test shall be performed in the same manner as the initial test as outlined in the "Arc Welder Qualification" and "Oxyacetylene Welder Qualification" sections, Item 5 on Page 2 and Item 6 on Page 3.

Qualification Tests

10. Employees who fail to meet the requirements for a qualification test may be retested immediately. In such a case, the employee shall make two welds of each type that failed to meet the requirements. For the guided root bend test, satisfactory welds will be indicated if no more than one specimen out of each weld is rejected (see the "Test Weld Inspection Requirements" section, Item 8.) In addition, rejection of specimens from both weld tests at the same specimen position shall be cause for rejection. For the knock-off test, both specimens must pass.

11. The qualification test may be terminated at any point when it becomes apparent to the welding inspector that the welder lacks the skills necessary to produce satisfactory results or exceeds the time limits as outlined in the "Test Weld Procedure" section, Item 7C on Page 3.

12. Employees who fail to meet the requirements for a qualification test shall be required to have further training or practice. In such a case, a complete retest shall be made subsequent to such training or practice.

Welder Qualification for Under 20% of SMYS

Records

Records for all welders who have been qualified under this standard shall be retained as outlined below:

13. All employee qualification and requalification records must be retained for a minimum duration of 5 years.
14. The record shall be made by completing Form FD-30-A and/or FD-30-B, respectively.
15. Use a separate test report for each qualification or verification. Do not combine a qualification and verification test on a single test report.
16. The division/CGT offices are responsible for retaining all test reports for their respective employees to verify that the welders have maintained their qualification(s).
17. GD&TS, GFS (welding and testing group) is responsible for retaining test reports for GC employees.

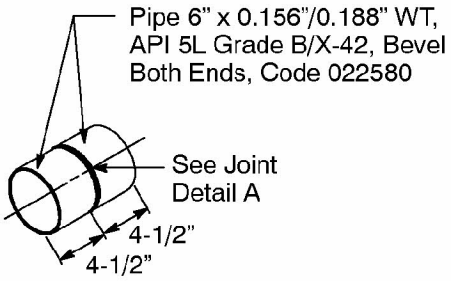


Figure 1
Arc Butt Weld Test
Two Spools Required

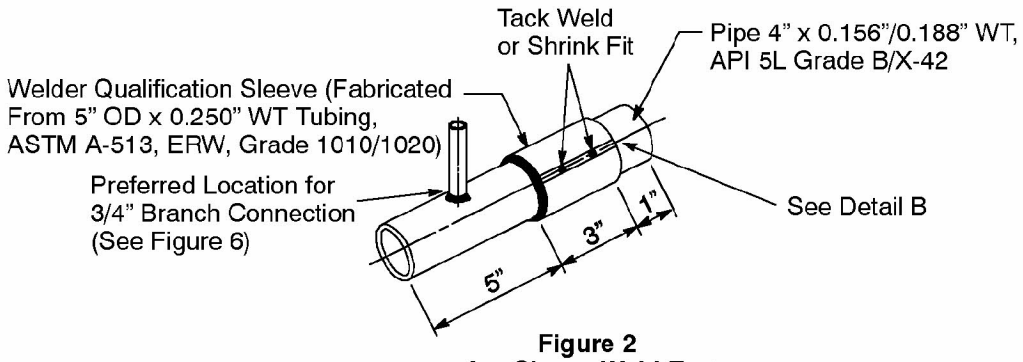
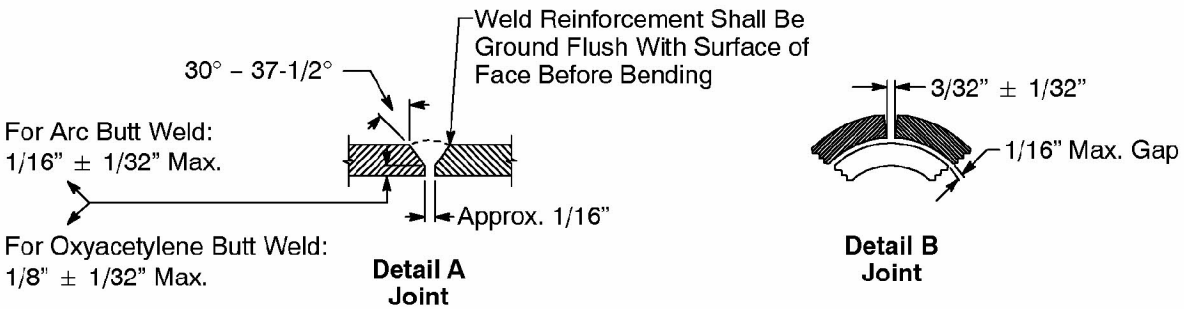


Figure 2
Arc Sleeve Weld Test
Sleeve Tack Welded or Shrink Fit to Pipe.
Welder Performs All Welds for Visual Inspection.
Complete Sleeve Assembly, Code 022059



Welder Qualification for Under 20% of SMYS

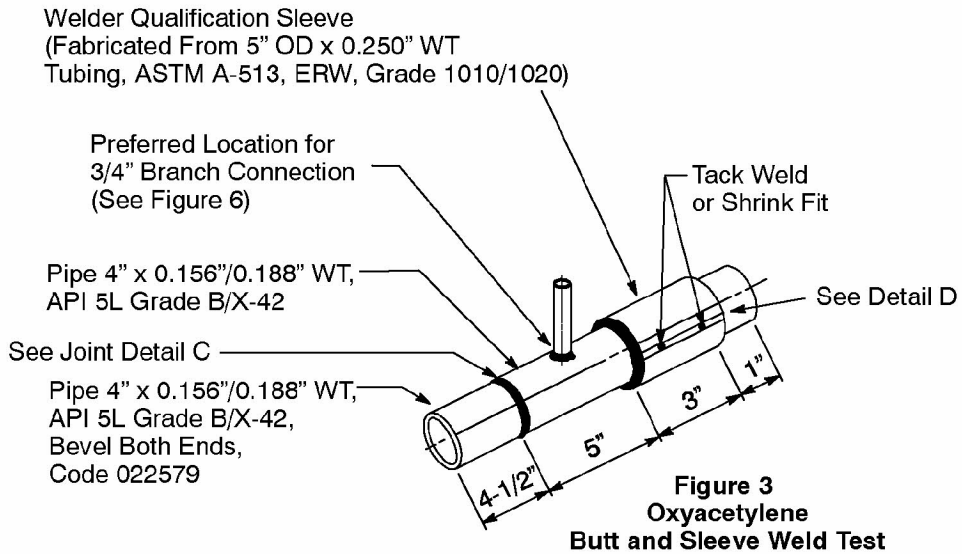
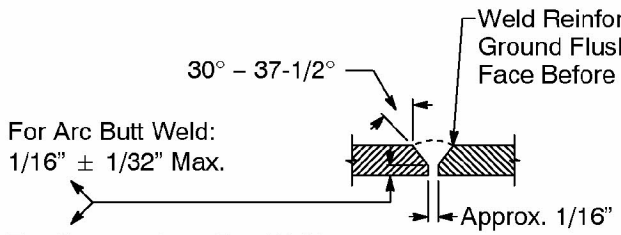
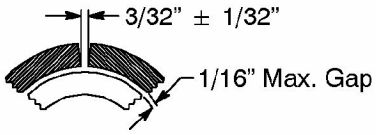


Figure 3
Oxyacetylene
Butt and Sleeve Weld Test

Perform Butt Weld Test on One End of Sleeve Weld Test Specimen.
Complete Sleeve Assembly, Code 022059.
4" Pipe, 4-1/2" Long, Code 022579.



Detail C
Joint



Detail D
Joint

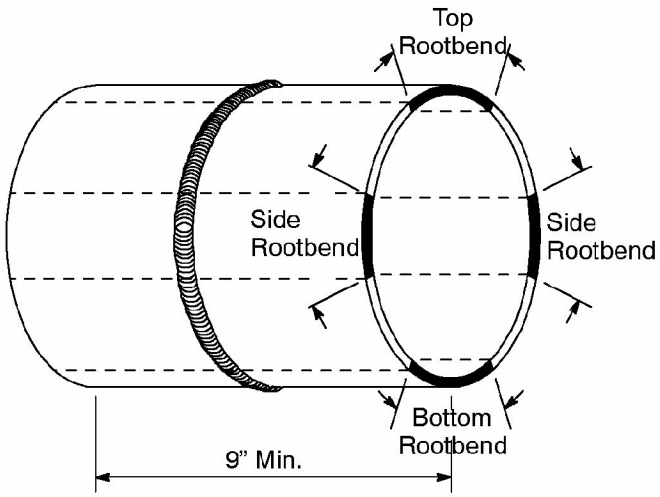


Figure 4
Specimen Selection

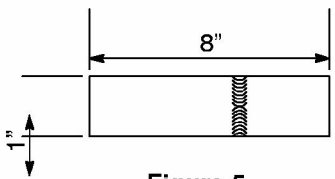


Figure 5
Test Sample Specimen

Note: Bend Specimens in Guided Bend Jig (Gas Standard M-25).
See Gas Standard D-31 for Weld Quality Requirements.

Preparation of Arc and Oxyacetylene Butt Weld Specimens

Welder Qualification for Under 20% of SMYS

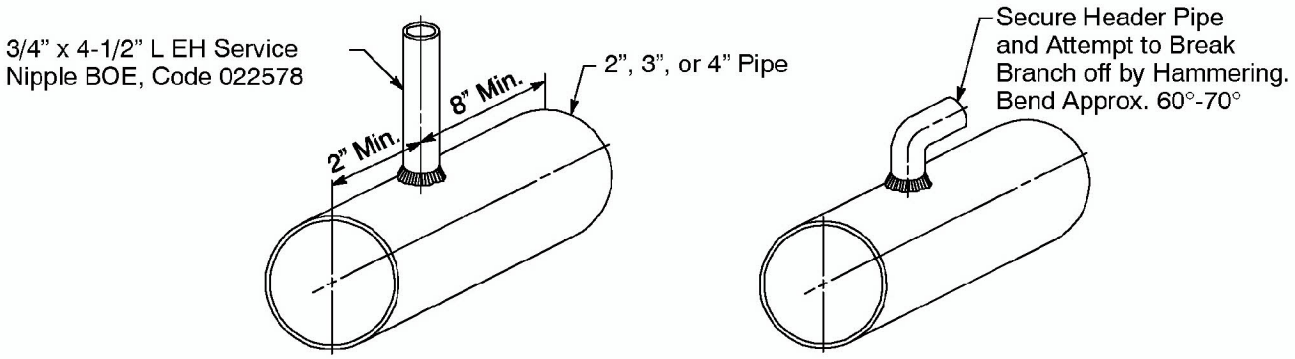


Figure 6
Service "Knock-Off" Test

For Welders Working on Pipe Lines With MAOP or Future Design
Pressure That Produces a Hoop Stress of Less Than 20% of SMYS

Attachments

Attachment A . . Form FD-30-A, "Arc Weld Test Report"
Attachment B . . Form FD-30-B, "Oxyacetylene Weld Test Report"

Revision Notes

Revision 01 has the following changes:

1. Updated the "Acronyms" section.
2. Deleted all references to Gas Standard D-30.1 (canceled), "Oxyacetylene Welder Qualifications for Over 20% of SMYS" and Gas Standard D-30.2, "Arc Welder Qualification for Working on Pipelines That Operate at Over 20% of SMYS."
3. Added GD&TS, GFS as the weld inspecting and testing group to Item 2 on Page 2.
4. Deleted a requalification test requirement from the "General Information" section as the test is no longer required (for butt welds only), if there is a change in position of weld from vertical to horizontal or vice versa.
5. Used standard format for the measurements.
6. Relocated Item 5 (test report retention) from the "General Information" section to the "Records" section, Item 16 on Page 4.
7. Converted Items 6 through 8 in the "General Information" section into Table 1, "Approved Products" on Page 2.
8. Added maximum time limits to oxyacetylene and arc welding tests. See Item 7C on Page 3.
9. Deleted obsolete code number 010310 from Figure 2 on Page 4.
10. Added separate tolerances for oxyacetylene and arc butt welds in Detail C on Page 5.
11. Deleted the test sample marking on test coupons in Figure 5 on Page 5.
12. Added the "Attachments" section.
13. Extracted Attachment A, "Arc Weld Test Report" and Attachment B, "Oxyacetylene Weld Test Report" from this gas standard. These attachments are two separate MS Word files, Form FD-30-A and Form FD-30-B, respectively.
14. This document is part of Change 57.