Prepared by: [redacted]

ARC WELDER QUALIFICATION FOR WORKING ON PIPELINES THAT OPERATE AT OVER 20% OF SMYS

D-30.2

Department:	Gas System Maintenance and Technical Support	**Section:** System Integrity	**Date:** 10-26-99
Approved by:	[redacted]	**Approved by:** S. Y. Chwistek	

Rev. #02: This document replaces Revision #01. For a description of the changes, see Page 4.

Purpose and Scope

This gas standard establishes the requirements for arc welding on all grades of pipe and fittings.

Acronyms

API: American Petroleum Institute
AWS: American Welding Society
CFR: Code of Federal Regulations
OD: outside diameter
psi: pounds per square inch
SMYS: specified minimum yield strength

General Information

1. A welder qualified under this gas standard may perform arc welding on all grades of pipe and fittings up to and including X-70. This would include all natural gas lines designed to operate at stress levels of 20% or more of the SMYS to comply with 49 CFR Part 192, latest edition.
2. The gas standard definitions contained in the API Standard 1104, latest edition, and referenced in Appendix A of 49 CFR Part 192, latest edition, shall apply to this standard.

Qualification Test

3. A welding inspector may terminate a qualification test at any point when it becomes apparent that a welder lacks the skill necessary to produce satisfactory results.
4. Welders may use a grinder during a qualification test only to grind the stringer bead (root pass) before applying the hot pass (second pass) and to feather starts and stops or clean and remove occasional minor undercut, porosity, or slag. Grinding shall not be used extensively during the course of a test for removing gross welder-induced defects. Excessive use of a grinder shall be grounds for termination of the test.
5. Welders shall use the same welding technique and proceed with the same speed that was used to qualify the weld procedure.
6. Qualification and requalification tests shall be performed under the supervision of a qualified welding inspector.

   This inspector shall not leave the immediate area while the welding test is being performed. For the purposes of this standard, a qualified welding inspector is a designated employee that has the experience and knowledge to judge the quality of welds (see Gas Standard D-40, "Weld Inspection").

   The supervisor shall not designate a welding inspector without the approval of the weld inspection and test group.
7. Before performing any production welding on pipelines or components designed to operate at over 20% of SMYS, welders shall be qualified using an approved procedure. The weld shall meet the visual inspection requirements of Gas Standard D-40, "Visual Inspection." The weld shall also be qualified by either the radiographic testing requirements of Gas Standard D-31, "Standards of Acceptability for Welding Nondestructive and Destructive Testing" (for butt welds only), or the destructive testing requirements of Gas Standard D-31. The radiographic testing requirements are located under the "Standard of Acceptability Nondestructive Testing" section. The destructive testing requirements are located in either the "standards of Acceptability – Destructive Testing" or the "Destructive Testing of Welded Joints – Branch Welds" section.

   A. The following tests can be performed on steel pipe of any grade; however, the qualification test described below is based on using API 5L Grade B pipe.

Arc Welder Qualification for Working on Pipelines that Operate at Over 20% of SMYS

(1) Butt Weld - The welder shall make a butt weld on 12-3/4" OD x 0.375" wall thickness pipe in the fixed position with the axis of the pipe either in the horizontal plane or inclined from the horizontal plane at an angle not exceeding 45° (see Figure 1, Page 3). The 6010 butt weld test shall not exceed 2 hours and the 7018 butt weld test shall not exceed 3 hours.

(2) Branch Connection for Full Qualification – The welder shall layout, cut, fit and weld a full size branch connection on 12-3/4" OD pipe. The weld shall be made with the run pipe axis in the horizontal position and the branch pipe axis extending vertically downward from the run (see Figure 2, Page 4). The 6010 branch connection test shall not exceed 6 hours and the 7018 branch connection test shall not exceed 7 hours.

B. Scope of Qualification

(1) Full Qualification - A welder who has successfully completed the 12-3/4" OD butt weld qualification test described in Paragraph 7A(1) and a full size 12-3/4" OD branch connection weld described in Paragraph 7A(2) shall be qualified to weld on natural gas pipelines in all positions; on all wall thicknesses, joint designs (including fillet welds) and fittings; and on all pipe diameters and all grades of pipe if the essential variables in Paragraph 8 remain unchanged.

(2) Qualification by destructive testing, as described in Paragraph 7, is required before welding compressor station piping or components.

(3) Note that when welding with low-hydrogen electrodes, the essential variables listed in Paragraph 8 are changed from those used in the qualification procedure described in Paragraph 7A. Welders must be requalified using the new procedure before making these welds.

Requalification

8. If any of the following essential variables are changed, the welder must be requalified using the new procedure.

A. A change from one welding process to any other welding process or combination of welding processes.

B. A change in the direction of welding from vertical up to vertical down or vice versa. (The direction of welding shall be only as allowed by Gas Standard D-22, "Arc Welding Procedure Requirements – All Stress Levels.")

C. A change in filler metal classification from Group 1 or 2 to Group 3 or from Group 3 to Group 1 or 2. (See Table 1.)

Table 1 Filler Metal Classification Groups

Group	AWS Specification	Electrode
I	A5.1	E6010, E6011
	A5.5	E7010, E7011
II	A5.5	E8010, E8011, E8011
III	A5.1	E7015, E7016, E7018
	A5.5	E8015, E8016, E8018

9. Requalifying Arc Welders

A. Welders shall be requalified no later than the last day of the sixth calendar month following the calendar month in which the last previous test was satisfactorily passed. Requalification may consist of successfully passing a radiographic examination of a production butt weld, or by repeating the butt weld test in Paragraph 7. If the sixth month expires before requalification, the welder must pass the full qualification test again (Paragraph 7).

B. A requalification test using the destructive method of testing as described in Paragraph 7 may also be required if there is reason to question the welder's ability.

C. Annually, all welders who work on compressor station piping must pass a butt weld test using the destructive method of testing as described in Gas Standard D-31, "Standards of Acceptability – Destructive Testing" section.

Retests

10. If in the opinion of the welding inspector, a welder fails to pass the qualification or requalification test because of an unavoidable condition or conditions beyond his/her control, the welder may be given a second opportunity to

qualify by repeating the test(s) required for qualification or requalification. No further retests shall be given until the welder gets further training or has more practice.

11. Welders who fail to pass the qualification test as described in Paragraph 7, or the requalification test as described in Paragraph 9, and who do not meet the conditions described in Paragraph 10, must:
    A. Undergo further training or practice before retesting. The extent of training or practice required shall be determined by the welding inspector.
    B. Pass both the "butt weld" test and the "branch connection" test outlined in Paragraph 7 in order to be qualified or requalified, if previously qualified.

Records

12. Records for all welders who have been qualified under this gas standard shall be retained as outlined below.
    A. All "Employee Qualification and Requalification" records must be retained for a minimum of five years.
    B. All "Employee Qualification and Requalification" records must be retained even through temporary lapses in a welder's qualification.
    C. The "Employee Qualification and Requalification" record shall be documented by filling out Exhibit 1, "Arc Welder Qualification Test."

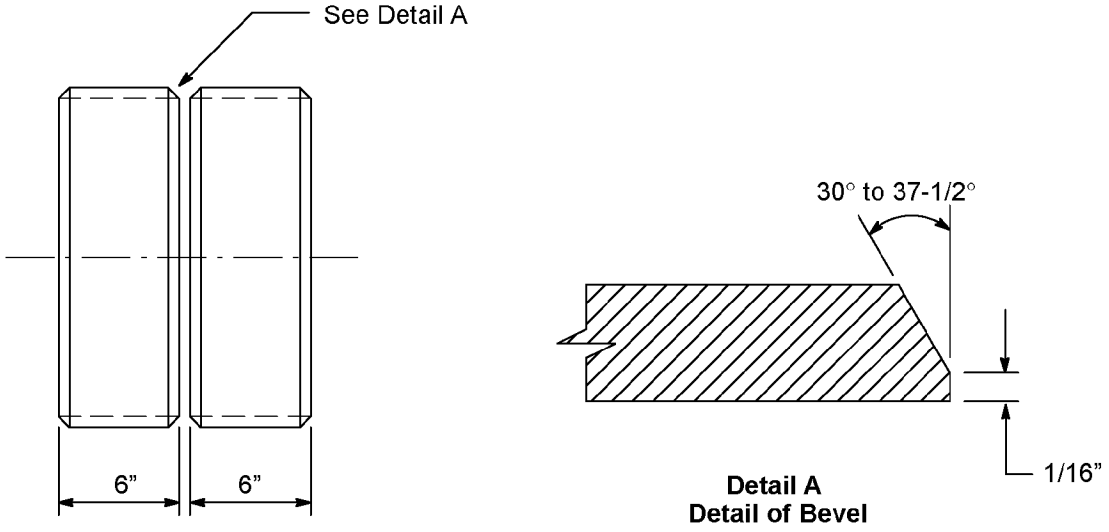


Figure 1
Butt Weld Test Spools

Butt Weld Test Spools Notes

1. Welders can use spools to qualify for both cellulose-coated and low-hydrogen electrodes, as documented in Gas Standard D-22.
2. Refer to Gas Standard D-31, for the type, number and location(s) of butt weld test specimens.
3. Welds must meet the visual testing requirements of Gas Standard D-40, and either the radiographic testing requirements or the destructive testing requirements of Gas Standard D-31.

Ordering Instructions

Specify

Spool, test, 12-3/4" OD, 0.375" wall thickness, API 5L Grade B, 6' length with 30° through 37.5° bevel at both ends. Gas Standard D-30.2, Code 022583.

Arc Welder Qualification for Working on Pipelines that Operate at Over 20% of SMYS

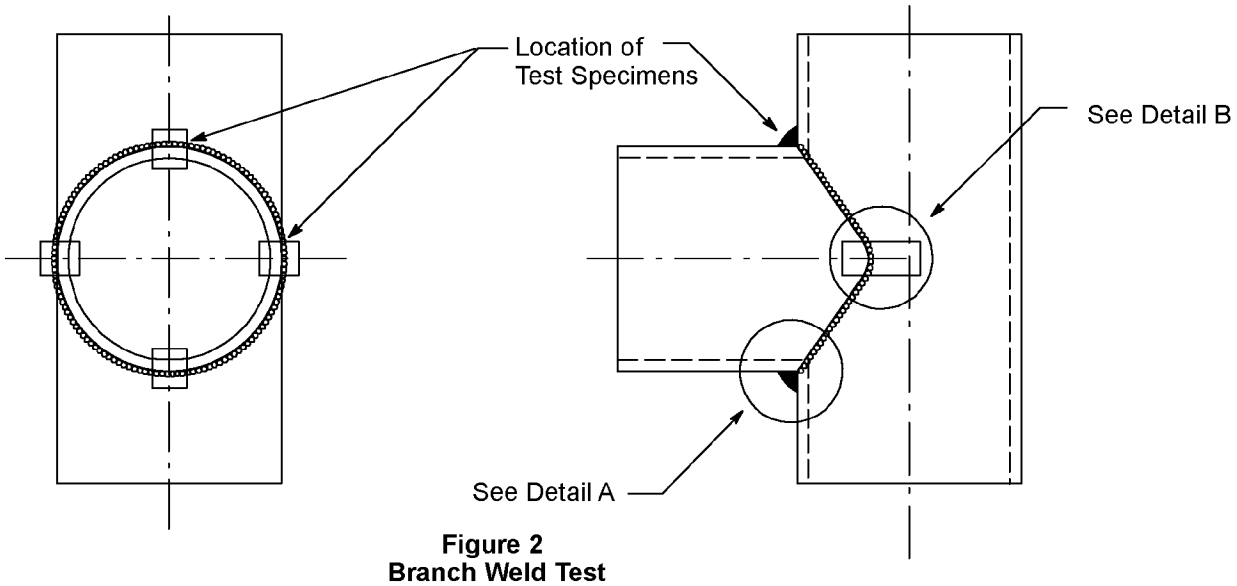
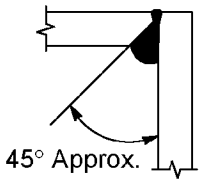
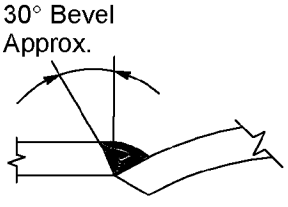


Figure 2
Branch Weld Test



Detail A
Weld Detail



Detail B
Weld Detail

Branch Weld Test Notes

1. Tests for welding a branch connection for full qualification (the welder is qualified to make any size branch).
   A. The pipe is 12-3/4" OD x 0.375" wall thickness, API 5L Grade B.
   B. The welder must lay out, cut, fit and weld a branch fitting connection. A full hole is to be cut in the run.
   C. The weld is to be made with the run pipe axis fixed in the horizontal position and the branch pipe axis extending vertically downward from the run.
   D. The weld must meet the visual testing requirements of Gas Standard D-40, Section 4, and the destructive testing requirements of Gas Standard D-31, "Visual Inspection" section.
   E. Four nick break specimens are required from the locations indicated. Specimens shall meet the requirements of Gas Standard D-31.
2. Tests for welding a branch connection for limited qualification (the welder is qualified to make 6" and smaller branches).
   A. The pipe is 6-5/8" OD x 0.280" wall thickness, API 5L Grade B.
   B. Follow the directions as described in Paragraphs 1B through 1E above.

Revision Notes

Revision 02 has the following changes.

1. Revised Paragraph 1 to include X-70 pipe and fittings.
2. Added welding inspector requirements to Paragraph 6.
3. Revised Paragraph 8.C to clarify filler metal classification groups.
4. Added Paragraph 10 on Pages 2 and 3 to clarify retest specifications. Former Paragraph 10 is now Paragraph 11.
5. This document is part of Change 46.

Arc Welder Qualification for Working on Pipelines that Operate at Over 20% of SMYS

Exhibit 1

Revised 4/99

Arc Welder Qualification Test
for Piping Systems Operating at Hoop Stresses of 20% or More of the Specified Minimum Yield Strength

☐ Passed Date Last Tested: _____ Date: _____

☐ Failed Further Training Required: _____

Welder: _____ S.S. No. _____

Butt Dia. _____ Pipe Spec. _____ Grade: _____ Wall Thickness: _____

Branch Diameter

☐ Exx10 ☐ Micro Wire ☐ Butt Tester: _____ (PG&E)

☐ Exx18 ☐ Other _____ ☐ Branch Weld Position: _____

Electrode Material / **Electrical** / **Welding**

Bead	Manufacturing and AWS Class	Diameter	Polarity	Amps	Volts	Direction
1st Bead						
2nd Bead						
Other Bead						

Tensile Tests

Specimen	Width	Thickness	Area – Sq. In.	Load – Pounds	Stress – psi	Remarks
1						
2						
3						
4						

Face Bend or Side Bend

Specimen	Location	No. Cracks	Max. Dimension	Location	Remarks
1					
2					

Root Bend or Side Bend

1					
2					

Nice Break

Specimen		Gas Pockets			Slag Inclusion				Remarks
No.	Location	No.	Max. Size	Between	No.	Length	Between	Fusion	
1									
2									
3									
4									