


Prepared by: [Redacted]

	OXYACETYLENE WELD PROCEDURE		D-20
	Department: Gas Distribution and Technical Services	Section: Gas Engineering and Planning	Approved by: [Redacted]
Rev. #00: This document replaces PG&E Drawings 086431 and 283263. For a description of the changes, see Page 4.			

Purpose and Scope

This standard complies with [49 CFR Part 192, Subpart E](#) and specifies the requirements for, and defines the limitations of, oxyacetylene welding on gas piping systems operating under 20% of SMYS.

Acronyms

- API: American Petroleum Institute
- ASTM: American Society for Testing and Materials
- AWS: American Welding Society
- CFR: *Code of Federal Regulations*
- GD&TS: Gas Distribution and Technical Services
- psig: pounds per square inch gauge
- SMYS: specified minimum yield strength

References

Document

Gas Standards and Specifications

[Welder Qualification for Under 20% of SMYS](#) [D-30](#)

Code of Federal Regulations

[Welding of Steel in Pipelines](#) [49 CFR 192, Subpart E](#)

American Petroleum Institute

Welding of Pipelines and Related Facilities Standard 1104

Welding Specification

1. Materials To Be Welded

The oxyacetylene welding process is limited to use on pipe manufactured to API 5L, 5LX and ASTM A-106 and A-53 specifications, forged steel fittings and fittings manufactured from ASTM A-106 Grade A and B seamless pipe materials.

2. Welding

All welding on pipe and fittings shall be completed using detailed procedural specifications that have been established, qualified, and recorded in accordance with [49 CFR Part 192](#) and API 1104.

3. Application

A. The oxyacetylene welding process may be used on steel gas piping systems designed to operate at stress levels under 20% SMYS within the following limitations:

- (1) Pipe size 4" diameter and smaller, including butt and sleeve welds, patches, and other repairs.
- (2) Lateral connection 2" diameter and smaller off header diameter not to exceed 8".
- (3) Pipe wall thickness maximum 0.188".

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4. Materials and Equipment

- A. The welding rod type shall meet the requirements of AWS Publication A5.2 Class RG60, and shall be approved by GD&TS. Sizes are specified in Table 1.
- B. The codes for approved welding rods are 159050 (1/8" x 36" RG60) and 150185 (3/32" x 36" RG60).
- C. Welding tip size is specified in Table 1.
- D. Only approved oxygen and acetylene regulators shall be used.
 - (1) Acetylene shall not be used at a pressure in excess of 15 psig.
 - (2) Oxygen and acetylene regulators for welding should be set to pressures listed in Table 1.
- E. All tools and equipment used in welding operations shall be in good operating condition, and shall be of a capacity suited to the work for which they are employed.

Table 1 Materials and Equipment

Joint Design	Pipe Size (Inches)	Welding Tip Orifice Size		Welding Rod Diameter (Inches)	Pipe Bevel (Degrees)	Flame Characteristic	Regulator Pressure (psig)	
		Drill Size	Inches				Oxygen	Acetylene
Butt Welds	3/4 – 2	56–53	0.046 – 0.060	3/32 – 1/8	30 – 37-1/2	Neutral	7 – 10	5 – 7
	3 – 4	53–49	0.060 – 0.073	1/8	30 – 37-1/2	Neutral	7 – 10	5 – 7
Fillet Weld	3/4 – 1-1/2	56–53	0.046 – 0.060	3/32 – 1/8	30 – 37-1/2	Neutral	7 – 10	5 – 7
	2 – 4	53–49	0.060 – 0.073	1/8	30 – 37-1/2	Neutral	7 – 10	5 – 7

5. Weld Preparation

- A. Before welding, the weld groove and the adjacent surfaces up to 1" around it shall be cleaned and kept free of all dirt, paint, rust, scale, moisture, oil, grease, or other foreign material harmful to welding. Clean by filing, hand or power wire brushing or grinding, and/or by using approved solvents. Alcohol (methanol or ethanol) or acetone are acceptable solvents for cleaning and drying. Do not expose these solvents or their fumes to open flame, arcs, or hot surfaces.
- B. Before sections of pipe and fittings are assembled for welding, all rust, scale, slag, dirt, liquids, or other foreign matter shall be removed from the inside surface of the pipe by swabbing with clean rags or by other acceptable methods. The responsible person (people) on the job shall ensure compliance with this requirement.
- C. The weld design requirements for end bevels, fillet welds, fitting, joints, and branch connections are specified in Figure 1 through Figure 5 on Page 3.
- D. Lineup clamps shall be used on 3" and 4" diameter pipe and is optional on 2" diameter pipe. Maintain 1/8" to 3/16" root gap. Two-inch pipe shall be tack welded at a minimum of two points and welding commenced at a third point. Three- and four-inch pipe shall be tack welded at a minimum of three points and welding commenced at a fourth point.
- E. Adequate working clearance shall be provided around the pipe at all joints to be welded. Flammable materials shall be removed or protected and a fully charged fire extinguisher shall be immediately available at each location where welding or cutting will be conducted.
- F. The welding operation must be protected (shielded) from any weather conditions (rain, snow, ice, or high winds) that would impair the quality of the completed weld.

6. Welding Technique

- A. Butt Welds
 - (1) Horizontal Welds (butt welds with pipe axis in the vertical position) and Vertical Welds (butt welds with pipe axis in the horizontal position)
 - (a) Welds shall be completed by using the forehand process.
 - (b) Welds shall be performed using a single pass method.

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- (c) Use the joint design as shown in Figure 1 and Figure 2 on Page 3.
- (d) The pipe shall be adequately supported and alignment maintained during welding.

B. Fillet Welds

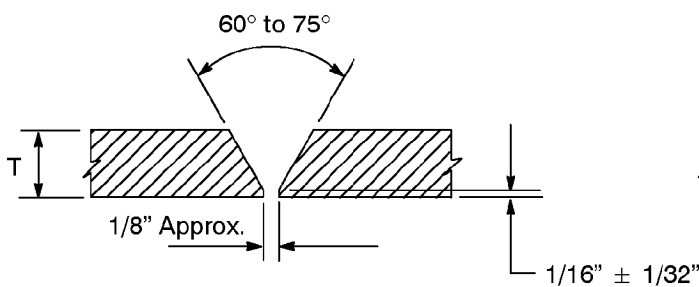
- (1) The bead shape of all fillet welds shall be flat or slightly convex, and the length of each weld leg shall be equal. All attachments using fillet welds shall be made in accordance with Figure 3 through Figure 5 on Page 3.
 - (a) Welds shall be completed by using the forehand process, and uphill method only.
 - (b) Welds shall be performed using a single pass method.
 - (c) The pipe shall be adequately supported and alignment maintained during welding.

7. Stress Relief

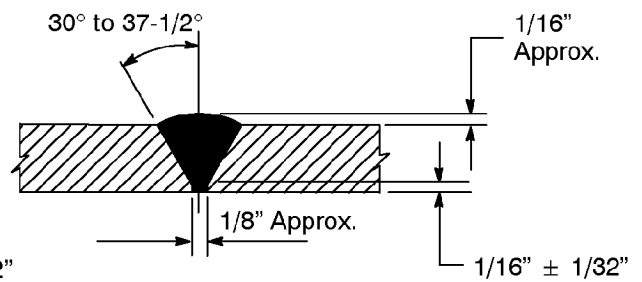
Stress relief is not required.

8. Cooling

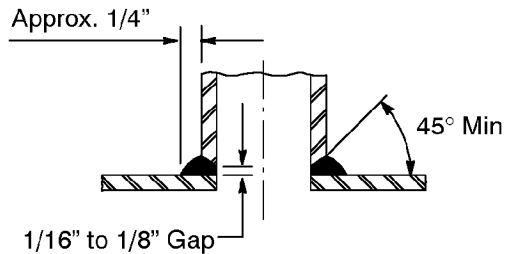
There shall be no accelerated cooling of weld joints.



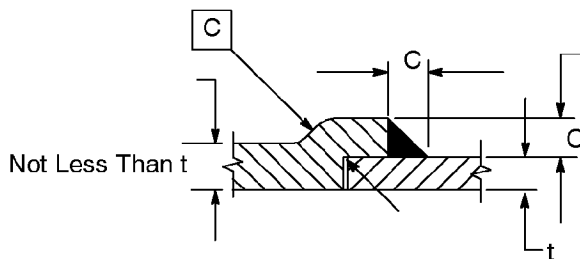
**Figure 1
Butt-Weld Joint Design**



**Figure 2
Standard Butt-Weld Design**

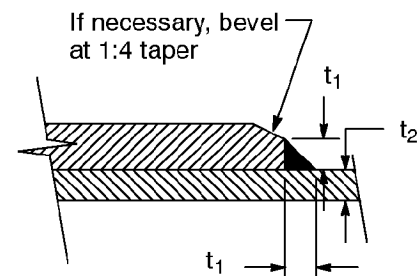


**Figure 3
Branch Abutting Header**



t = Wall Thickness Nominal
 C Minimum = 1-1/4 t, But Not Less Than 5/32"

**Figure 4
Socket-Welding Joint**



t₁ Min. = t₂
 t₁ Max. = 1.4 t₂

**Figure 5
Welding Sleeve Attachments or Patches**

Revision Notes

Revision 00 has the following changes:

1. Converted PG&E Drawings 086431 and 283263 to Gas Standard D-20.
2. Added the "Purpose and Scope," "Acronyms," "References," and "Revision Notes" sections.
3. Changed the maximum header pipe diameter from 4" to 8" in Item 3A(2) on Page 1.
4. Added the code numbers for the RG60 welding rods.
5. Revised the oxygen and acetylene regulator pressure settings.
6. Added a single pass method for butt, vertical, and fillet welds in Item 6 on Page 2.
7. Changed the maximum angle of the pipe bevel in Table 1 on Page 2 and Figure 2 on Page 3 from 40° to 37-1/2° to reflect joint design for butt welds.
8. This document is part of Change 57.