1. SCOPE

1.1 This standard complies with CPUC G.O. 112-C and specifies the requirements for, and defines the limitations of, oxy-acetylene welding on natural gas piping systems. Included are instructions on welding procedure, preparation of materials, work methods, welding technique, design of welded joints, and qualification of operators.

1.2 No deviations shall be made from this welding standard except as may be authorized by the Manager of the Gas System Design Department.

2. WELDING PROCEDURE

2.1 Application

2.1.1 The oxy-acetylene method may be used on steel gas piping systems designed to operate at stress levels under 20% of SMYS within the following limitations:

2.1.1.1 Pipe 4" and smaller, including butt & sleeve welds, and patches or other repairs.

2.1.1.2 Lateral connection 2" and smaller off 4" or smaller header.

2.1.1.3 Pipe wall thickness maximum 0.188".

2.1.2 The oxy-acetylene method may be used on steel gas piping systems designed to operate at stress levels over 20% of SMYS within the following limitations:

2.1.2.1 Butt welds on pipe 2" and smaller.

2.1.2.2 Pipe wall thickness maximum 0.154".

2.1.3 For higher stress levels, larger or heavier wall pipe, arc weld according to Standard D-22.

2.1.4 The oxy-acetylene 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.

2.2 Method

Oxy-acetylene welding of piping must be performed by the uphill method.

CHG.	DATE	DESCRIPTION	APPRD.	CHG.	DATE	DESCRIPTION	APPRD.
0	11-20-77	SUPERSEDES 084495					

APPROVED

BY
DSGN.
DR.
CH.
O.K.
DATE 11-18-75
SCALE

PIPING - DATA SHEET
OXY-ACETYLENE WELD PROCEDURE
GAS STANDARD
PACIFIC GAS AND ELECTRIC COMPANY

SUPERSEDES 084495
SUPERSEDED BY
SHEET No. 1 OF 4 SHEETS
DRAWING NUMBER 086431
CHANGE 0

2.3 Materials and Equipment

2.3.1 The welding rod type shall meet the requirements of AWS Publication A5.2 Class RG60, and shall be approved by Gas System Design Department. Sizes shall be as specified in Table 1.

2.3.2 Welding torch tip size shall be as specified in Table 1.

2.3.3 Only approved two stage oxygen and acetylene regulators shall be used.

2.3.3.1 Acetylene shall not be used at a pressure in excess of 15 psi gauge pressure.

2.3.3.2 Oxygen and acetylene regulators for welding should have equal pressure settings between 5 psi and 8 psi.

2.3.4 Flame characteristics shall be neutral.

2.3.5 All tools and equipment used in welding operations shall be in first-class operating condition. and shall be of a capacity suited to the work for which they are employed.

2.3.6 Suitable wind guards and welders' platforms shall be provided where conditions warrant.

TABLE 1

Type of Weld	Pipe Size	Welding Tip Orifice Size		Size of Welding Rod	Pipe Bevel	Flame Characteristic
		Drill Size	Inches			
BUTT WELDS	3/4" - 2"	56-49	.0465-.0730	1/8"	30°-40°	Neutral
	3" & 4"	53-43	.0595-.0890	1/8"	30°-40°	Neutral
FILLET WELD or SERVICE CONNECTION	3/4" - 1½"	56-49	.0465-.0730	1/8"	45°	Neutral
	2" - 4"	53-36	.0595-.1065	1/8" or 3/16"	45°	Neutral

2.4 Weld Preparation

2.4.1 All oxides and foreign matter shall be removed prior to welding. The surfaces shall be smooth, uniform, and free of materials which might adversely affect the welding operation.

2.4.2 Before the lengths of pipe are welded together, all loose rust, debris, and dirt shall be removed from the inside of the pipe.

2.4.3 The weld design requirements for end bevels, fillet welds fitting joints, and branch connections are specified by Drawing 283263 (Page 5). All end treatments shall be prepared in conformance with these design requirements.

2.4.4 External offset shall not exceed 1/16".

2.4.5 When unequal wall thicknesses are joined, internal offset shall not exceed 3/32". If this value is exceeded, the excess thickness of the heavier end shall be machined or ground back from the bevel on a four-to-one taper.

2.4.6 Use of a lineup clamp is required on 3" and 4", and is optional on 2". Maintain minimum 1/8" 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.

2.4.7 Adequate working clearance shall be provided around the pipe at all joints to be welded. Flamable materials shall be removed or protected and suitable fire extinguishing equipment shall be immediately at hand.

2.5 Welding Technique

2.5.1 Horizontal Welds (Butt Welds with Pipe in Vertical Position)

Horizontal welds should be avoided when possible. Welds shall be completed by the forehand process. Roll welds should be made when practical. The pipe shall be adequately supported and alignment maintained during welding.

2.5.2 Vertical Welds (Pipe in Horizontal Fixed Position)

Vertical welds shall be made by the forehand and uphill method only. The pipe shall be adequately supported and alignment maintained during welding.

2.5.3 Fillet Welds (Sleeves, Patches, Service Connections, Flanges, Fittings)

2.5.3.1 The shape and dimensions for fillet welds shall be as shown on Drawing 283263 (Page 5).

2.5.3.2 The weld design requirements prescribed by Drawing 283263 (Page 5) shall be used for all fillet welds.

2.5.4 Stress-Relief

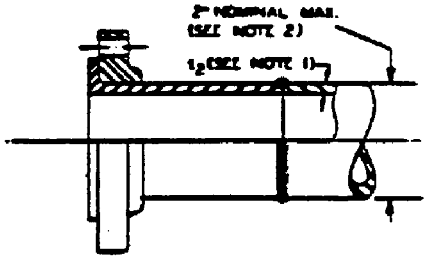
Stress-relief is not required.

2.5.5 Cooling

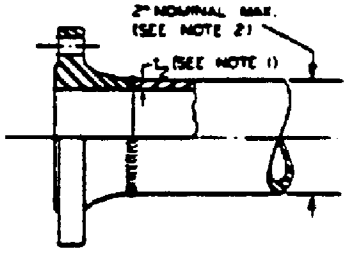
There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600°F.

3. OPERATOR QUALIFICATIONS

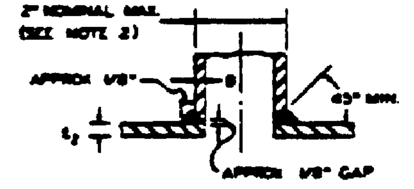
The requirements for qualifying test welds and keeping of records of operator qualification are specified in Gas Standard D-30.



LAP JOINT FLANGE

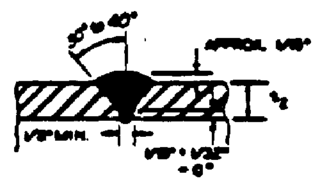


BUTT WELDING FLANGE



BRANCH ABUTTING HEADER

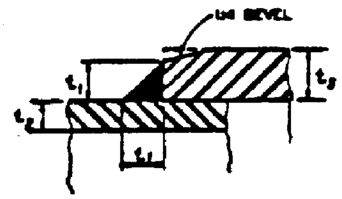
WELDING OF BRANCH CONNECTION JOINT DESIGN
(BRANCH CONNECTIONS REQUIRING REINFORCING ARE NOT ALLOWED - SEE NOTE 2)



BUTT JOINT WELD

t_1 MINIMUM = 1.4 t_2, BUT NOT LESS THAN 5/32"

SOCKET WELDING ONLY



SLEEVE ATTACHMENTS OR PATCHES

t_1 MIN = t_2
t_1 RECOMMENDED = 1.2 t_2 TO 1.4 t_2
t_1 MAX = 1.4 t_2
t_3 MAX = .250" (1/4")

NOTES

1. FOR OXY-ACETYLENE WELDING, t_2 (PIPE WALL THICKNESS) SHALL NOT EXCEED .188" (3/16").
2. SLIP-ON AND SOCKET WELD FLANGES, BRANCH CONNECTIONS REQUIRING REINFORCEMENT, AND WELDS ON SIZES OR WALL THICKNESS ABOVE THOSE ALLOWED BY THIS STANDARD, MUST BE ARC WELDED PER STANDARD D-22.

FOR WELDING NATURAL GAS PIPELINES BY THE OXY-ACETYLENE WELDING PROCESS

APPROVED		CHG	DATE	DESCRIPTION	BY	CH.	APPD.
		4	4-26-73	Sleeve Attachment Changed from t_1 & t_2; Title Revised	J.C.	A.K.E.	
		3	1-71	Added Saddle Type Reinforcement and new sheet	B.C.M.		
		2	6-70	Updated and removed fitting joint design			
		5	10-28-76	Chg'd dims on Plate from Let; Removed items which are to be Arc Welded (Redrawn)	C.A.		

SUPV. BY DEPT. OF GO	PIPING - DETAILS	SUPERSEDES 083718	
DSGN.	ATTACHMENT USING BUTT OR FILLET WELDS	SUPERSEDED BY	
DR. [redacted]	GAS STANDARD	SHEET NO. 1 OF 2 SHEETS	
CH.	PACIFIC GAS AND ELECTRIC COMPANY	283263	5
O.K.	SAN FRANCISCO, CALIFORNIA		
DATE 12-17-64 / SCALE —			