

PACIFIC GAS AND ELECTRIC COMPANY
San Bruno Gas Transmission Line Incident
Data Response

PG&E Data Request No.:	NTSB_010-005-S4		
PG&E File Name:	San Bruno GT Line Incident_DR_NTSB_010-005-S4		
Request Date:	June 9, 2011	Requesting Party:	NTSB
Date Sent:	July 7, 2011	Requestor:	Operations (Chhatre/Nicholson)

QUESTION 5

Please provide any and all construction quality assurance or quality control standards or guidelines that would have been in place and applicable for the relocation of segment 180 during the 1956 GM136471 project.

ANSWER 5 – SUPPLEMENT 4

Supplementing PG&E's prior response, please see attached Gas Standard and Specifications which PG&E is informed and believes were applicable, or a prior iteration of the attached standards were applicable, during the segment 180 relocation.

Given the breadth of the request and the extremely short response time allowed, PG&E has not been able to conduct an exhaustive records search and cannot confidently assert that the attached document as well as the documents previously produced in response to this data request reflect "any and all" potentially responsive documents.

VIA EMAIL

July 7, 2011

Mr. Ravindra Chhatre, P.E., Accident Investigator
National Transportation Safety Board
490 L'Enfant Plaza, East S.W.
Washington, DC 20594

Mr. Sunil Shori
Utilities Safety and Reliability Branch
Consumer Protection and Safety Division
California Public Utilities Commission
505 Van Ness Avenue, Room 2005
San Francisco, CA 94102-3298

Re: San Bruno GT Line Incident - NTSB Investigation

Dear Ravi and Sunil:

Attached in this email is a data response and responsive document for the following request. On Friday, July 8, 2011, we will send (via FedEx) a DVD with a compilation of all the responses and documentation produced during the week.

NTSB_010-005-S4 Please provide any and all construction quality assurance or quality control standards or guidelines that would have been in place and applicable for the relocation of segment 180 during the 1956 GM136471 project.

Very truly yours,



/GEC

William D. Hayes

Attachments

**GAS STANDARDS
AND
SPECIFICATIONS**

P • G • and E •

**DEPARTMENT OF GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
245 MARKET ST., SAN FRANCISCO**

PIPE SIZE INCHES	DIAMETER		WALL THICKNESS INCHES	CIRCUMFERENCE		TRANSVERSE AREA			LENGTH PER SQ. FOOT OF EXTERNAL SURFACE FEET	VOLUME PER FOOT OF PIPE		GALLONS PER FOOT OF PIPE	WEIGHT PER FOOT FLAT ENDS POUNDS	FEET PER TON
	EXTERNAL INCHES	INTERNAL INCHES		EXTERNAL INCHES	INTERNAL INCHES	EXTERNAL SQ. INS.	INTERNAL SQ. INS.	METAL SQ. INS.		EXTERNAL CU. FT.	INTERNAL CU. FT.			
1/8	.405	.269	.068	1.272	.845	.129	.077	.072	9.431	.0009	.0004	.0030	.245	8171.7
1/4	.540	.364	.088	1.696	1.144	.229	.104	.125	7.074	.0016	.0007	.0054	.425	4707.9
3/8	.675	.493	.091	2.121	1.549	.358	.191	.167	5.659	.0025	.0013	.0099	.568	3523.7
1/2	.840	.622	.109	2.639	1.954	.554	.304	.250	4.547	.0038	.0021	.0158	.851	2350.2
3/4	1.050	.824	.113	3.299	2.589	.866	.533	.333	3.638	.0060	.0037	.0277	1.131	1768.6
1	1.315	1.049	.133	4.131	3.296	1.358	.864	.494	2.905	.0094	.0060	.0449	1.679	1191.2
1 1/8	1.660	1.380	.140	5.215	4.335	2.164	1.496	.669	2.301	.0150	.0104	.0777	2.273	880.0
1 1/4	1.900	1.610	.145	5.969	5.058	2.835	2.036	.799	2.010	.0197	.0141	.1058	2.718	735.9
2	2.375	2.067	.154	7.461	6.494	4.430	3.356	1.075	1.608	.0308	.0233	.1743	3.653	547.5
2 1/4	2.875	2.469	.203	9.032	7.757	6.492	4.788	1.704	1.329	.0451	.0332	.2487	5.793	345.2
3	3.500	3.068	.216	10.996	9.638	9.621	7.393	2.228	1.091	.0668	.0554	.3840	7.576	264.0
3 1/4	4.000	3.548	.226	12.566	11.146	12.566	9.887	2.680	.955	.0873	.0687	.5136	9.109	219.6
4	4.500	4.026	.237	14.137	12.648	15.904	12.730	3.174	.849	.1104	.0884	.6633	10.790	185.3
5	5.563	5.047	.258	17.477	15.856	24.306	20.006	4.300	.687	.1688	.1389	1.0393	14.628	136.8
6	6.625	6.065	.280	20.813	19.054	34.472	28.890	5.581	.577	.2394	.2006	1.5008	18.974	105.4
8	8.625	7.981	.322	27.096	25.073	58.426	50.027	8.399	.443	.4057	.3474	2.5988	28.554	70.0
10	10.750	10.020	.365	33.772	31.479	90.763	78.854	11.908	.355	.6303	.5476	4.0963	40.483	49.4
12	12.750	12.000	.375	40.055	37.699	127.676	113.097	14.579	.300	.8866	.7854	5.8752	49.563	40.4
14	14.000	13.250	.375	43.982	41.626	153.938	137.886	16.052	.273	1.0690	.9575	7.1629	54.569	36.7
16	16.000	15.250	.375	50.265	47.909	201.062	182.654	18.408	.239	1.3963	1.2684	9.4885	62.579	32.0
18	18.000	17.250	.375	56.549	54.192	254.469	233.705	20.764	.212	1.7671	1.6230	12.1405	70.589	28.3
20	20.000	19.250	.375	62.832	60.476	314.159	291.039	23.120	.191	2.1817	2.0211	15.1189	78.599	25.4
22	22.000	21.250	.375	69.115	66.759	380.133	354.656	25.476	.174	2.6398	2.4629	18.4237	86.609	23.1
24	24.000	23.250	.375	75.398	73.042	452.389	424.557	27.833	.159	3.1416	2.9483	22.0549	94.820	21.1
26	26.000	25.250	.375	81.681	79.325	530.929	500.740	30.189	.147	3.6870	3.4774	26.0125	102.630	19.5
28	28.000	27.250	.375	87.965	85.608	615.752	583.207	32.545	.136	4.2761	4.0501	30.2965	110.640	18.1
30	30.000	29.250	.375	94.248	91.892	706.858	671.957	34.901	.127	4.9087	4.6664	34.9069	118.650	16.9
32	32.000	31.250	.375	100.531	98.175	804.248	766.990	37.257	.119	5.5851	5.3263	39.8437	126.660	15.8
34	34.000	33.250	.375	106.814	104.458	907.920	868.307	39.614	.112	6.3050	6.0299	45.1068	134.670	14.9
36	36.000	35.250	.375	113.097	110.741	1017.876	975.906	41.970	.106	7.0686	6.7771	50.6964	142.680	14.0

Reference:
American Standard Wrought-Steel and Wrought-Iron Pipe (ASA. B36.10-1959)
For Gas Line Pipe Data - Dwg. 282690, F-18, A-11.

1	7-6-60	Added data 28-36" incl.	J.L.L.				
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CHK.	DATE	DESCRIPTION	APPRD.	CHK.	DATE	DESCRIPTION	APPRD.

BY DEPT. OF G.O.		GAS DEPARTMENT STANDARD				SUPERSEDES 180949	
DR. O.C. TR.		STANDARD PIPE DATA				SUPERSEDES BY	
CH. D.F.		PACIFIC GAS AND ELECTRIC COMPANY				SHEET NO. SHEETS	
O. K.		SAN FRANCISCO, CAL.				DRAWING NUMBER CHANGE	
DATE 11-24-59.		SCALE		282780		1	

PIPE SIZE INCHES	DIAMETER		WALL THICKNESS INCHES	CIRCUMFERENCE		TRANSVERSE AREA			LENGTH PER SQ. FOOT OF EXTERNAL SURFACE FEET	VOLUME PER FOOT OF PIPE		GALLONS PER FOOT OF PIPE	WEIGHT PER FOOT PLAIN ENDS POUNDS	FEET PER TON
	EXTERNAL INCHES	INTERNAL INCHES		EXTERNAL INCHES	INTERNAL INCHES	EXTERNAL SQ. INS.	INTERNAL SQ. INS.	METAL SQ. LBS.		EXTERNAL CU. FEET	INTERNAL CU. FEET			
1/8	.405	.215	.095	1.272	.675	.129	.036	.093	9.431	.0009	.0023	.0019	.315	6358.7
1/4	.540	.302	.119	1.696	.949	.229	.072	.157	7.074	.0016	.0005	.0037	.535	3232.9
3/8	.675	.423	.126	2.121	1.329	.358	.141	.217	5.659	.0025	.0010	.0073	.739	2707.1
1/2	.840	.546	.147	2.639	1.715	.554	.234	.320	4.547	.0038	.0016	.0122	1.088	1838.2
3/4	1.050	.742	.154	3.299	2.331	.866	.432	.433	3.638	.0060	.0030	.0225	1.474	1357.1
1	1.315	.957	.179	4.131	3.007	1.358	.719	.639	2.905	.0094	.0050	.0374	2.172	920.9
1 1/4	1.660	1.278	.191	5.215	4.015	2.164	1.283	.881	2.301	.0150	.0089	.0666	2.997	667.4
1 1/2	1.900	1.500	.200	5.969	4.712	2.835	1.767	1.068	2.010	.0197	.0123	.0918	3.631	550.8
2	2.375	1.939	.218	7.461	6.092	4.430	2.953	1.477	1.608	.0308	.0205	.1534	5.022	398.2
2 1/2	2.875	2.323	.276	9.032	7.298	6.492	4.238	2.254	1.329	.0451	.0294	.2202	7.661	261.1
3	3.500	2.900	.300	10.996	9.111	9.621	6.605	3.016	1.091	.0668	.0459	.3431	10.253	195.1
3 1/2	4.000	3.364	.318	12.566	10.568	12.566	8.888	3.678	.955	.0873	.0617	.4617	12.505	159.9
4	4.500	3.826	.337	14.137	12.020	15.904	11.497	4.407	.849	.1104	.0798	.5992	14.984	133.5
5	5.563	4.813	.375	17.477	15.120	24.306	18.194	6.112	.687	.1688	.1263	.9451	20.778	96.3
6	6.625	5.761	.432	20.813	18.099	34.472	26.067	8.405	.577	.2394	.1810	1.3541	28.573	70.0
8	8.625	7.625	.500	27.096	23.955	58.426	45.664	12.763	.443	.4097	.3171	2.3921	43.388	46.1
10	10.750	9.750	.500	33.772	30.631	90.763	74.662	16.101	.355	.6303	.5185	3.8785	54.736	36.5
12	12.750	11.750	.500	40.055	36.914	127.676	108.434	19.242	.300	.8866	.7930	5.6329	65.416	30.6
14	14.000	13.000	.500	43.982	40.841	153.938	132.732	21.206	.273	1.0650	.9218	6.8952	72.091	27.7
16	16.000	15.000	.500	50.265	47.124	201.062	176.715	24.347	.239	1.3963	1.2272	9.1800	82.771	24.2
18	18.000	17.000	.500	56.549	53.407	254.469	226.980	27.489	.212	1.7671	1.5763	11.7912	93.451	21.6
20	20.000	19.000	.500	62.832	59.690	314.159	283.929	30.631	.191	2.1817	1.9689	14.7288	104.132	19.2
22	22.000	21.000	.500	69.115	65.973	380.133	346.361	33.772	.174	2.6398	2.4053	17.9928	114.812	17.4
24	24.000	23.000	.500	75.398	72.257	452.389	415.476	36.914	.159	3.1416	2.8852	21.5831	125.492	15.9
26	26.000	25.000	.500	81.681	78.540	530.929	490.874	40.055	.147	3.6870	3.4088	25.4999	136.172	14.7
28	28.000	27.000	.500	87.965	84.823	615.752	572.555	43.197	.136	4.2761	3.9761	29.7431	146.852	13.6
30	30.000	29.000	.500	94.248	91.106	706.858	660.920	46.338	.127	4.9087	4.5869	34.3327	157.532	12.7
32	32.000	31.000	.500	100.531	97.389	804.248	754.768	49.480	.119	5.5851	5.2414	39.2087	168.212	11.9
34	34.000	33.000	.500	106.814	103.673	907.920	855.299	52.622	.112	6.3050	5.9396	44.4311	178.893	11.2
36	36.000	35.000	.500	113.097	109.956	1017.876	962.113	55.763	.106	7.0686	6.6813	49.9999	189.573	10.6

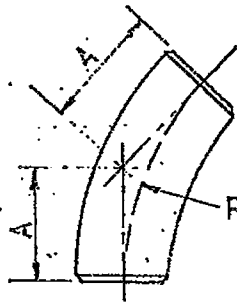
Reference:
American Standard Wrought-Steel and Wrought-Iron Pipe (ASA. B36.10-1959)
For Gas Line Pipe Data - Dwg. 282690

1 7-5-60 Added data 28"-36" incl.

T.L.L.

CHG.	DATE	DESCRIPTION	APPRD.	CHG.	DATE	DESCRIPTION	APPRD.
APPROVED							

BY DEPT. OF G. O.		GAS DEPARTMENT STANDARD		SUPERSEDES 180950	
DR. O. C. TR.		EXTRA HEAVY PIPE DATA		SUPERSEDED BY	
CH. <i>O.C.T.</i>		PACIFIC GAS AND ELECTRIC COMPANY		SHEET NO. SHEETS	
O. K.		SAN FRANCISCO, CAL.		DRAWING NUMBER CHASER	
DATE 12-3-50	SCALE NONE			282781 	



CODE		SIZE	RADIUS	A	NOMINAL DIAMETER			WALL THICKNESS		APPROX. WT. POUNDS		MAX. GWP PSI*			
STD.	E.H.				O.D.	I.D.		STD.	E.H.	STD.	E.H.	STD.	E.H.	STD.	E.H.
						STD.	E.H.								
022105		3/4		a	1.050	.824	.742	.113	.154	.08	.11	1848	3086		
		1-1/4			1.315	1.049	.957	.133	.179	.17	.23	1955	3066		
		1-1/2			1.660	1.380	1.278	.140	.191	.28	.39	1681	2646		
022145	022106	2-		1-1/8	1.900	1.610	1.500	.145	.200	.40	.55	1552	2463		
022107		2-1/2			2.375	2.067	1.939	.154	.218	.72	1.05	1361	2213		
		3-			2.875	2.469	2.323	.203	.276	1.5	2.1	1660	2467		
022157		3-1/2	6	2-	3.500	3.068	2.900	.216	.300	2.3	3.2	1481	2242		
		4			4.000	3.548	3.364	.226	.318	3.2	4.6	1375	2097		
		5			4.500	4.026	3.826	.237	.337	4.3	6.1	1299	2000		
022158	022183	6	7-1/2	3-1/8	5.563	5.047	4.813	.258	.375	7.3	10.0	1170	1831		
022008		8			6.625	6.065	5.761	.280	.432	11.2	17.3	1087	1810		
		10			8.625	7.891	7.625	.322	.500	22.5	35	988	1640		
022009		12		6-1/4	10.750	10.020	9.750	.365	.500	40	55	919	1316		
022148		16			12.750	12.000	11.750	.375	.500	59	79	799	1110		
		20			b	16.000	15.250	15.000	.375	.500	98	131	637	884	
		24		c	20.000	19.250	19.000	.375	.500	155	205	510	707		
		30		d	24.000	23.250	23.000	.375	.500	223	295	425	590		
		30		e	30.000	29.250	29.000	.375	.500	358	475	340	475		

* AT 100° F.

- 1) FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A234 - MATERIAL ASTM A-106 GRADE A OR B.
- 2) STANDARD DIMENSIONS ASA B16.9.
- 3) MAXIMUM ALLOWABLE GWP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B31.1), GAS & AIR PIPING AT 100° F (SECTION 2, DIV.1) - (ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS). IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GWP BY MULTIPLYING BY 1.167.

SIZES SUPPLIED	
GRANE	1" TO 16"
GRINWELL	3/4" " 12"
MIDWEST	2" " "
TAYLOR	3/4" " 24"
TUBE-TURN	" " 30"

4) ALL DIMENSIONS IN INCHES.

DIMENSION	GRANE	GRINWELL	MIDWEST	TAYLOR	TUBE-TURN
a	-	7/16	3/4	9/16	7/16
b	8-1/2	-	-	10	9-15/16
c	-	-	-	12-1/2	12-7/16
d	-	-	-	15	14-15/16

3	10-52	REVISED	NOTE No. 1		
2	7-30	REVISED			
1	7-16	REVISED			

CHG. DATE	DESCRIPTION	APPR. CHG.	DATE	DESCRIPTION	APPR.

APPROVED /

BY Dept. of G.O.

DR. *[Signature]*

CH. *[Signature]*

O.K.

DATE 8-8-45

SCALE

GAS DEPARTMENT STANDARD

45° LONG RADIUS WELDING ELBOWS

PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CAL.

SUPERSEDES

SUPERSEDED BY

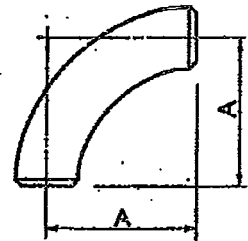
SHEET No. 081465

SHEETS 3

DRAWING NUMBER CHANGE

CODE	SIZE	A	NOMINAL OUTSIDE DIAMETER	NOMINAL INSIDE DIAMETER	NOMINAL WALL THICK.	APPROX WEIGHT POUNDS	MAX. GWP
STANDARD							
022108	1/2	1-1/2	.840	.622	.109	.18	2180
	3/4	1-1/2	1.050	.824	.113	.25	1848
022076	1-	1-1/2	1.315	1.049	.133	.38	1955
022200	1-1/4	1-7/8	1.660	1.380	.140	.50	1681
022136	2-	2-1/4	1.900	1.610	.145	.76	1552
022109	2-1/2	3-	2.375	2.067	.164	1.75	1381
022103	3-	3-3/4	2.875	2.469	.203	3.50	1860
	3-1/2	4-1/2	3.500	3.068	.216	5.00	1481
022039	4-	5-1/4	4.000	3.548	.228	7.00	1375
	5	6-	4.500	4.026	.237	8.25	1239
022091	6	7-1/2	5.563	5.047	.253	16.	1170
022043	8	9	6.625	6.065	.260	25.	1087
022041	10	12	8.625	7.981	.282	50.	988
022104	12	15	10.750	10.020	.285	85.	919
022203	16	18	12.750	12.000	.275	85.	789
	20	24 Ø	16.000	15.250	.275	180.	637
	24	30 Ø	20.000	19.250	.275	315.	510
	24	36 Ø	24.000	23.250	.275	446.	425
	30	45 Ø	30.000	29.250	.275	720.	340
EXTRA HEAVY							
	3/4	1-1/8	1.050	.742	.154	.37	3088
	1-	1-1/2	1.315	.957	.179	.50	3086
	1-1/4	1-7/8	1.660	1.278	.191	.75	2846
022101	1-1/2	2-1/4	1.900	1.500	.200	1.5	2463
	2-	3-	2.375	1.899	.218	2.0	2413
022196	2-1/2	3-3/4	2.875	2.323	.276	4.0	2887
	3-	4-1/2	3.500	2.800	.300	6.5	2242
022204	3-1/2	5-1/4	4.000	3.354	.318	9.	2097
	4	6	4.500	3.623	.337	13.	2000
022174	5	7-1/2	5.563	4.813	.375	22.	1831
	6	9	6.625	5.761	.432	35.	1810
022158	8	12	8.625	7.625	.500	78.	1640
	10	15	10.750	9.750	.500	119.	1316
	12	18	12.750	11.750	.500	165.	1110
022190	16	24 Ø	16.000	15.000	.500	275.	884
	20	30 Ø	20.000	19.000	.500	420.	707
	24	36 Ø	24.000	23.000	.500	592.	590
	30	45 Ø	30.000	29.000	.500	853.	476

* AT 100° F



ALL DIMENSIONS IN INCHES

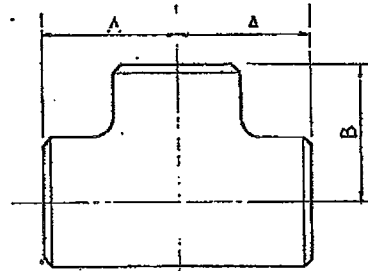
- NOTES:
1. FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A-234, MATERIAL ASTM-A-106 GRADE A. IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
 2. STANDARD DIMENSIONS ASA B16.9.
 3. MAXIMUM ALLOWABLE GWP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B31.1), GAS & AIR PIPING AT 100°F (SECTION 2, DIV. 1)-(ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS). IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GWP BY MULTIPLYING BY 1.167.
 4. SIZES CRANE & TAYLOR, 3/4"-24"; GRINGELL, 3/4"-16"; MIDWEST, 3/4"-24"; TUBE TURN, 1/2"-30".
 5. Ø DOES NOT APPLY TO CRANE.
 6. WHEN ORDERING 16"-30" INCL. SPECIFY MANUFACTURER AND KIND.

CHG.	DATE	DESCRIPTION	APPRD.	CHG.	DATE	DESCRIPTION	APPRD.
APPROVED							
BY Dept of G.A.		GAS DEPARTMENT STANDARD				SUPERSEDES 081260	
DR.	90° LONG RADIUS WELDING ELBOWS					SUPERSEDED BY	
CH. <i>H.R.</i>						SHEET NO.	
C. K.	PACIFIC GAS AND ELECTRIC COMPANY					DRAWING NUMBER	
DATE	SCALE	SAN FRANCISCO, CAL.				281992	
10-8-52						CHANGE	

CODE NO.	NOMINAL PIPE SIZE	DIMENSION		OUTSIDE DIAMETER	INSIDE DIAMETER	WALL THICKNESS	APPROX. WEIGHT POUNDS	MAX. * GWP POUNDS
		A	B					
STANDARD								
022116	1/2	1	1	.840	.622	.109	.25	2150
	3/4	1-1/8	1-1/8	1.050	.824	.113	.38	1848
022178	1	1-1/2	1-1/2	1.315	1.049	.133	.73	1855
	1-1/4	1-7/8	1-7/8	1.660	1.390	.140	1.40	1681
022112	1-1/2	2-1/4	2-1/4	1.900	1.610	.145	1.93	1552
022113	2	2-1/2	2-1/2	2.375	2.027	.164	2.45	1361
022201	2-1/2	3	3	2.875	2.469	.203	5.08	1660
022197	3	3-3/8	3-3/8	3.500	3.038	.216	7.00	1481
022144	3-1/2	3-5/4	3-5/4	4.000	3.548	.228	9.12	1375
	4	4-1/8	4-1/8	4.500	4.028	.237	11.25	1259
022150	5	4-7/8	4-7/8	5.583	5.047	.258	21.5	1170
	6	5-5/8	5-5/8	6.625	6.065	.280	33.8	1037
022210	8	7	7	8.625	7.661	.322	53.3	888
022198	10	8-1/2	8-1/2	10.750	10.020	.365	81.	619
	12	10	10	12.750	12.000	.375	111.	799
	16	12	12	16.000	15.250	.375	175.	697
	20	15	C	20.000	19.250	.375	321.	510
24	17	D	24.000	23.250	.375	445.	425	
EXTRA HEAVY								
	1/2	1	1	.840	.548	.147	.30	3590
	3/4	1-1/8	1-1/8	1.050	.742	.164	.47	3088
	1	1-1/2	1-1/2	1.315	.957	.179	.87	3088
	1-1/4	1-7/8	1-7/8	1.660	1.278	.191	1.68	2846
	1-1/2	2-1/4	2-1/4	1.900	1.500	.200	2.25	2483
	2	2-1/2	2-1/2	2.375	1.938	.218	3.00	2213
	2-1/2	3	3	2.875	2.323	.278	6.00	2487
	3	3-3/8	3-3/8	3.500	2.900	.300	8.50	2242
	3-1/2	3-5/4	3-5/4	4.000	3.364	.318	11.9	2037
	4	4-1/8	4-1/8	4.500	3.826	.337	15.8	2000
022172	5	4-7/8	4-7/8	5.583	4.813	.375	26.	1631
	6	5-5/8	5-5/8	6.625	5.761	.432	44.	1810
022168	8	7	7	8.625	7.625	.500	78.	1640
	10	8-1/2	8-1/2	10.750	9.750	.500	101.	1318
	12	10	10	12.750	11.750	.500	140.	1110
	16	12	12	16.000	15.000	.500	257.	684
	20	15	C	20.000	19.000	.500	407.	707
24	17	D	24.000	23.000	.500	563.	580	

*At 100° F.

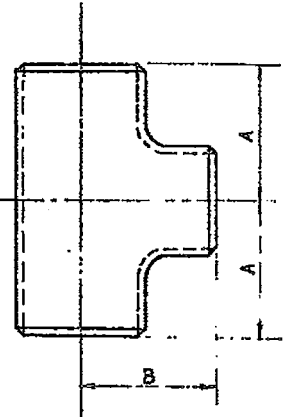
- NOTES: 1. FITTINGS TO BE MANUFACTURED IN COMPLIANCE WITH ASTM SPEC. A-234, MATERIAL ASTM A-105 GRADE A. IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
2. STANDARD DIMENSIONS ASA B 16.9
3. MAXIMUM ALLOWABLE GWP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B 31.1), GAS AND AIR PIPING AT 100°F (SECTION 2, DIVISION 1). ALLOWANCE IS MADE FOR HILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS. IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GWP BY MULTIPLYING BY 1.167
4. DIMENSION "C" CRANE & MIDWEST 12-1/2" TUBE-TURN 15" 14-3/4" 17"
5. ALL DIMENSIONS IN INCHES
6. SIZES CRANE & MIDWEST 3/4"-24" GRINSELL 3/4"-12". TAYLOR 3/4"-16", TUBE-TURN 1/2"-24"



39-52 CHANGED NOTE 1		APPR. [Signature]					
CHG.	DATE	DESCRIPTION	APPR.	CHG.	DATE	DESCRIPTION	APPR.
APPROVED [Signature]							
BY Dept. of G.O.		GAS DEPARTMENT STANDARD WELDING TEES-BEVEL END TYPE				SUPERSEDES 081261	
DR. L.M. Mergenthaler.		DEPARTMENT OF ENGINEERING PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.				SUPERSEDED BY	
CH.	[Signature]					SHEET NO.	SHEETS
C. K.	[Signature]					281760	1
DATE	SCALE						
3-1-40	None.						

CODE		SIZE - INCHES				DIMENSION INCHES		APPROX. WT. LBS.		MAXIMUM GWP PSI *	
STD.	E.H.					A	B	STD.	E.H.	STD.	E.H.
		1	X 1	X 1/2	1-1/2	1-1/2	.77	.87	1055	2088	
		1	X 1	X 3/4	1-1/2	1-1/2	.80	.95	1048	2088	
		1-1/2	X 1-1/2	X 5/4	2-1/4	2-1/4	2.12	2.45	1552	2489	
		1-1/2	X 1-1/2	X 1	2-1/4	2-1/4	2.20	2.60	1552	2489	
		2	X 2	X 1-1/2	2-1/2	2	2.38	3.0	1841	2213	
		2	X 2	X 1-1/2	2-1/2	2-3/8	2.72	3.5	1841	2213	
		2-1/2	X 2-1/2	X 1-1/2	3	2-1/4	4.23	5.2	1680	2487	
		2-1/2	X 2-1/2	X 1-1/2	3	2-5/8	4.75	5.2	1680	2487	
		2-1/2	X 2-1/2	X 2	3	2-3/4	6.15	6.0	1680	2487	
022214		3	X 3	X 1-1/2	3-3/8	2-5/8	6.0	7.8	1481	2242	
		3	X 3	X 1-1/2	3-3/8	2-7/8	6.4	7.6	1481	2242	
		3	X 3	X 2	3-3/8	3	7.5	9.0	1481	2242	
		3	X 3	X 2-1/2	3-3/8	3-1/4	7.5	9.0	1481	2242	
022138		4	X 4	X 1-1/2	4-1/8	3-3/8	10.3	13.0	1299	2000	
		4	X 4	X 2	4-1/8	3-1/2	10.3	13.0	1299	2000	
		4	X 4	X 2-1/2	4-1/8	3-3/4	10.8	16.8	1299	2000	
		4	X 4	X 3	4-1/8	3-7/8	10.8	18.0	1299	2000	
022205		6	X 6	X 2-1/2	5-5/8	4-3/4	32.0	41.3	1097	1610	
		6	X 6	X 3	5-5/8	4-7/8	31.5	41.0	1097	1610	
		6	X 6	X 4	5-5/8	5-1/8	31.8	41.5	1097	1610	
		8	X 8	X 3	7	6	50.0	67.3	988	1640	
		8	X 8	X 4	7	6-1/8	49.3	67.3	988	1640	
		8	X 8	X 6	7	6-5/8	52.5	68.0	988	1640	
		10	X 10	X 4	8-1/2	7-1/4	75	92	819	1316	
		10	X 10	X 6	8-1/2	7-5/8	79	94	819	1316	
		10	X 10	X 8	8-1/2	8	77	100	819	1316	
		12	X 12	X 6	10	8-5/8	105	136	799	1110	
		12	X 12	X 8	10	9	106	134	799	1110	
		12	X 12	X 10	10	9-1/2	107	140	799	1110	
		16	X 16	X 8	12	a	63	110	697	884	
		16	X 16	X 8	12	b	109	141	697	884	
		16	X 16	X 10	12	11-1/8	119	158	697	884	
		16	X 16	X 12	12	11-5/8	128	167	697	884	
		20	X 20	X 8	15	12-3/4	235	307	610	707	
		20	X 20	X 10	15	13-1/8	236	308	610	707	
		20	X 20	X 12	15	c	238	309	610	707	
		20	X 20	X 15	15	d	232	373	610	707	
		24	X 24	X 10	17	15-1/8	412	580	425	590	
		24	X 24	X 12	17	15-5/8	413	581	425	590	
		24	X 24	X 16	17	e	417	535	425	590	
		24	X 24	X 20	17	f	422	539	425	590	

* AT 100° F.



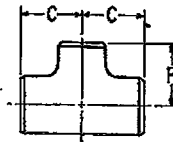
DIMENSION	a	b	c	d	e	f
CRANE	-	10-5/8	12-1/2	12-1/2	14-3/4	14-3/4
MIDWEST	-	-	-	-	-	-
TAYLOR	10-1/4	-	-	-	-	-
TUBE-TURN	10-3/8	10-3/4	15-5/8	14	16	17

- NOTES: 1. FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASTM SPEC. A-234, MATERIAL ASTM A-108 GRADE A. IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
 2. STANDARD DIMENSIONS ASA B 16.8
 3. MAXIMUM ALLOWABLE GWP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B 31.1) GAS AND AIR PIPING AT 100°F (SECTION 2, DIVISION 1). ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS. IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GWP BY MULTIPLYING BY 1.167.
 4. ALL DIMENSIONS IN INCHES
 5. WALL THICKNESS SAME AS MS 1054
 6. DIMENSIONS APPLY TO CRANE, MIDWEST, TAYLOR & TUBE-TURN
 7. ϕ MADE BY TUBE-TURN ONLY

3-9-52 CHANGED NOTE 1		MR					
DATE	DESCRIPTION	APPRD.	ENG.	DATE	DESCRIPTION	APPRD.	
APPROVED <i>bat</i>							
By Dept. of G.O.				GAS DEPARTMENT STANDARD			
Dr. I. G. Mergentheim				REMOVING WELDING TEES-BETEL END TYPE			
C.H. <i>W</i>				DEPARTMENT OF ENGINEERING			
O.K. <i>W</i>				PACIFIC GAS AND ELECTRIC COMPANY			
DATE 7-27-50				SCALE None.			
				SUPERSEDED 081298			
				SUPERSEDED BY			
				SHEET NO. 281777		SHEET 1	
				SAN FRANCISCO, CAL.			

B-24

MS 1050



NOMINAL PIPE SIZE					DIMENSION	
					C	F
1	x	1	x	1/2	1-1/2	1-1/2
1	x	1	x	3/4	1-1/2	1-1/2
1-1/2	x	1-1/2	x	3/4	2-1/4	2-1/4
1-1/2	x	1-1/2	x	1	2-1/4	2-1/4
2	x	2	x	1	2-1/2	2
2	x	2	x	1-1/2	2-1/2	2-3/8
2-1/2	x	2-1/2	x	1	3	2-1/4
2-1/2	x	2-1/2	x	1-1/2	3	2-5/8
2-1/2	x	2-1/2	x	2	3	2-3/4
3	x	3	x	1-1/2	3-3/8	2-5/8
3	x	3	x	2	3-3/8	2-7/8
3	x	3	x	2-1/2	3-3/8	3
3	x	3	x	3	3-3/8	3-1/4
4	x	4	x	1-1/2	4-1/8	3-3/8
4	x	4	x	2	4-1/8	3-1/2
4	x	4	x	2-1/2	4-1/8	3-3/4
4	x	4	x	3	4-1/8	3-7/8
6	x	6	x	2-1/2	5-5/8	4-3/4
6	x	6	x	3	5-5/8	4-7/8
6	x	6	x	4	5-5/8	5-1/8
8	x	8	x	3	7	6
8	x	8	x	4	7	6-1/8
8	x	8	x	6	7	6-5/8
10	x	10	x	4	8-1/2	7-1/4
10	x	10	x	6	8-1/2	7-5/8
10	x	10	x	8	8-1/2	8
12	x	12	x	6	10	8-5/8
12	x	12	x	8	10	9
12	x	12	x	10	10	9-1/2
16	x	16	x	6	12	10-3/8
16	x	16	x	8	12	10-3/4
16	x	16	x	10	12	11-1/8
16	x	16	x	12	12	11-5/8
20	x	20	x	8	15	12-3/4
20	x	20	x	10	15	13-1/8
20	x	20	x	12	15	13-5/8
20	x	20	x	16	15	14
24	x	24	x	10	17	15-1/8
24	x	24	x	12	17	15-5/8
24	x	24	x	16	17	16
24	x	24	x	20	17	17

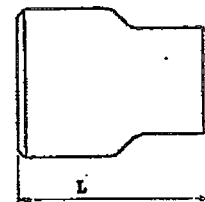
ALL DIMENSIONS ARE IN INCHES.

- FITTINGS 1" TO 24" SHALL HAVE DIMENSIONS, TOLERANCES, AND BE MANUFACTURED IN ACCORDANCE WITH A.S.A. STANDARD B16.9 (STEEL BUTT-WELDING FITTINGS); 26" AND LARGER IN ACCORDANCE WITH MSS STANDARD PRACTICE SP 48 (STEEL BUTT-WELDING FITTINGS.)
- FITTINGS 20" AND SMALLER ARE TO BE MANUFACTURED FROM WROUGHT CARBON STEEL, GRADE W.P.B. VARIETY, CONFORMING TO REQUIREMENTS OF A.S.T.M. SPECIFICATION A234 FOR GRADE B FITTINGS.

APPROVED							
CHG.		DATE		DESCRIPTION		BY	
SUPERV. BY D.F. Johnson				GAS STANDARD		SUPERSEDED BY	
DSGN.				REDUCING WELDING TEES		SUPERSEDED BY	
DR. J. AUSTIN				BEVEL END TYPE		SHEET NO.	
CH. <i>[Signature]</i>				PACIFIC GAS AND ELECTRIC COMPANY		SHEETS	
O.K.				SAN FRANCISCO, CALIFORNIA		DRAWING NUMBER	
DATE		SCALE				283220	
6-1-64		None				CHANGE	

CODE NO.		SIZE INCHES	L INCHES	APPROX. WT. LBS.		MAX. GAS W.P. PSIG	
STDL. DARD	EXTRA HEAVY			STD.	E.H.	STD.	E.H.
		3/4 x 1/2 3/4 x 3/8	1-1/2	.21 .21	.26 .24	2150 3690	
		1 x 3/4	2	.41	.54	1846	3068
022180		1-1/4 x 1 1-1/4 x 3/4	2	.59 .50	.75 .68	1681	2846
		1-1/2 x 1-1/4 1-1/2 x 1 1-1/2 x 3/4	2-1/2	.78 .64 .68	.98 .85 .76	1622	2463
022092 022175 022181	022147 022115	2 x 1-1/2 2 x 1-1/4 2 x 1 2 x 3/4	3	.63 .67 .78 .69	1.25 1.17 1.04 .95	1361	2213
		2-1/2 x 2 2-1/2 x 1-1/2 2-1/2 x 1-1/4 2-1/2 x 1	3-1/2	1.50 1.25 1.25 1.25	2.00 1.75 1.50 1.50	1660	2467
022093		3 x 2-1/2 3 x 2 3 x 1-1/2 3 x 1-1/4 3 x 1	3-1/2	2.00 1.75 1.50 1.50 1.50	2.63 2.25 2.25 2.25 2.25	1481	2242
022170							
022097 022025	022177	4 x 2-1/2 4 x 2 4 x 1-1/2 4 x 1-1/4 4 x 1	4	3.75 3.25 3.25 3.25 3.25	5.00 5.00 4.50 4.50 4.50	1299	2000
022154 022189 022085	022027	6 x 4 6 x 3-1/2 6 x 3 6 x 2-1/2 6 x 2	5-1/2	8.25 7.75 7.50 7.00 6.80	11.0 10.0 10.0 9.0 8.8	1097	1810
022042 022162		8 x 6 8 x 4 8 x 3-1/2 8 x 3	6	13. 11. 11. 11.	18. 18. 15. 14.	988	1640
022097 022099		10 x 8 10 x 6 10 x 4	7	22. 21. 20.	27. 25. 24.	919	1816
022193 022167 022216		12 x 10 12 x 8 12 x 6 12 x 4	8	33. 30. 28. 28.	40. 39. 37. 34.	799	1110
	022181	16 x 12 16 x 10 16 x 8	a b c	70. 68. 66.	93. 90. 88.	637	894
	022182	20 x 16 20 x 12	e d	183. 127.	160. 154.	610	707
		24 x 16 24 x 20	e e	160. 187.	211. 220.	425	590

* AT 100°F.

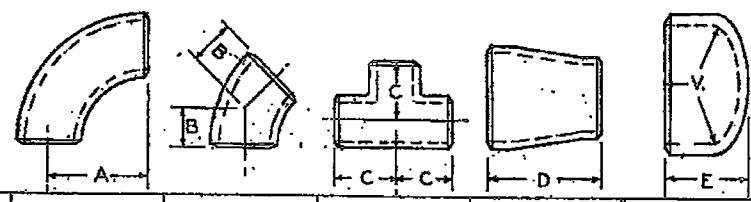


- a
- Crane 14
- Grinnell 12
- Midwest 14
- Taylor 12
- Tube Turn 14
- b
- Crane 14
- Grinnell 14
- Midwest 14
- Taylor 12
- Tube Turn 14
- c
- Crane 20
- Grinnell 18
- Midwest 20
- Taylor 20
- Tube Turn 20
- d
- Crane 20
- Grinnell 18
- Midwest 20
- Taylor 20
- Tube Turn 20
- e
- Crane 20
- Midwest 20
- Taylor 18
- Tube Turn 20

NOTES:

1. FITTINGS TO BE MANUFACTURED IN CONFORMANCE WITH ASME SPEC. A-234, MATERIAL ASTM-A-106 GRADE A, IF GREATER WORKING PRESSURE IS WANTED SPECIFY GRADE B.
2. STANDARD DIMENSIONS ASA B 16.9
3. MAXIMUM ALLOWABLE GAP BASED UPON STRESSES PERMITTED FOR PIPE OF SAME OR EQUIVALENT MATERIAL BY ASA CODE FOR PRESSURE PIPING (ASA B 31.1), GAS & AIR PIPING AT 100°F (SECTION 2, DIV. 1). ALLOWANCE IS MADE FOR MILL FABRICATING TOLERANCE AND FOR MINIMUM INTERNAL CORROSION CONDITIONS. IF GRADE B STEEL IS SPECIFIED OBTAIN INCREASED MAXIMUM ALLOWABLE GAP BY MULTIPLYING BY 1.167.

2	9-9-52	CHANGED NOTE 1					
1	2-6-52	CH'D PRESS. RATING 24" SIZE					
CHK.	DATE	DESCRIPTION	APPR.	CHK.	DATE	DESCRIPTION	APPR.
APPROVED J.O.P.						SUPERSEDES 0812.62	
BY Dept. of G.O.		GAS DEPARTMENT STANDARD CONCENTRIC WELDING REDUCERS				SUPERSEDED BY	
DR. I.G. Mergenthaler		DEPARTMENT OF ENGINEERING PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.				SHEET NO. 281778	
CH. 11/6/11						DRAWING NO. 2	
O.K.							
DATE 7-27-50							
SCALE None.							

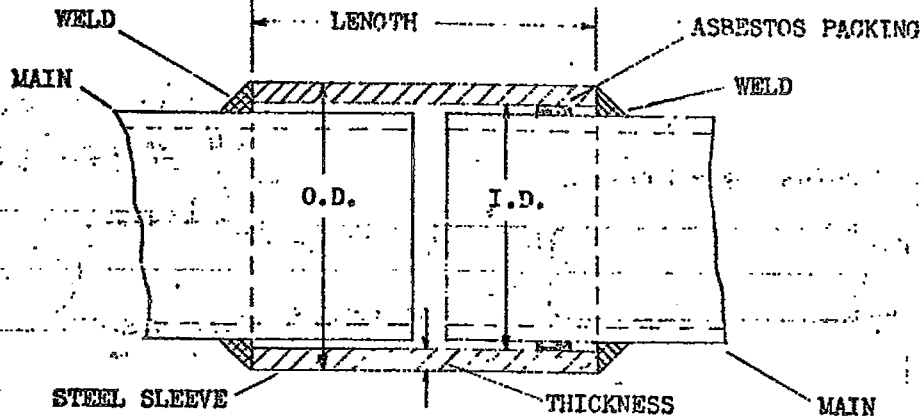


NOMINAL PIPE SIZE	90° ELBOW CENTER TO FACE A	45° ELBOW CENTER TO FACE B	STRAIGHT TEE C	CONCENTRIC REDUCER D	CAP E	STD. CAP VOLUME CU. INS. V.
3/4"	1 1/8"	7/16"	1 1/8"	1 1/2"	1 1/4"	.6
1"	1 1/2"	7/8"	1 1/2"	2"	1 1/2"	1.1
1 1/4"	1 7/8"	1"	1 7/8"	2"		1.9
1 1/2"	2 1/4"	1 1/8"	2 1/4"	2 1/2"		2.5
2"	3"	1 3/8"	2 1/2"	3"		3.9
3"	4 1/2"	2"	3 3/8"	3 1/2"	2"	11.3
4"	6"	2 1/2"	4 1/8"	4"	2 1/2"	24.5
6"	9"	3 3/4"	5 5/8"	5 1/2"	3 1/2"	78.4
8"	12"	5"	7"	6"	4"	150.7
10"	15"	6 1/4"	8 1/2"	7"	5"	299.1
12"	18"	7 1/2"	10"	8"	6"	523.1
14"	21"	8 3/4"	11"	13"	6 1/2"	664
16"	24"	10"	12"	14"	7"	978.0
18"	27"	11 1/4"	13 1/2"	15"	8"	1380.0
20"	30"	12 1/2"	15"	20"	9"	2043.3
22"	33"	13 1/2"	16 1/2"	20"	10"	2654.0
24"	36"	15"	17"	20"	10 1/2"	3476.1
26"	39"	16"	19 1/2"	24"		3813
30"	45"	18 1/2"	22"			4927
34"	51"	21"	25"			6161
36"	54"	22 1/4"	26 1/2"			6822

ALL DIMENSIONS ARE IN INCHES

- FITTINGS 1" TO 24" SHALL HAVE DIMENSIONS, TOLERANCES, AND BE MANUFACTURED IN ACCORDANCE WITH A.S.A. STANDARD B16.9 (STEEL BUTT-WELDING FITTINGS); 26" AND LARGER IN ACCORDANCE WITH MSS STANDARD PRACTICE SP 48 (STEEL BUTT-WELDING FITTINGS).
- FITTINGS 20" AND SMALLER ARE TO BE MANUFACTURED FROM WROUGHT CARBON STEEL, GRADE W.P.B. VARIETY, CONFORMING TO REQUIREMENTS OF A.S.T. M. SPECIFICATION A234 FOR GRADE B FITTINGS.
- FITTINGS 16" THROUGH 36" NOT COVERED ABOVE ARE TO BE DESIGNED SO THAT THE PRESSURE RATING IS THE SAME AS FOR PIPE MATERIAL OF THE SAME WALL THICKNESS MANUFACTURED TO A.P.I. 5LX SPECIFICATIONS, AS INDICATED ON MS-1052.

CHG.	DATE	DESCRIPTION	APPRD.	CHG.	DATE	DESCRIPTION	APPRD.
APPROVED J.L.L.							
BY	G. S. D. D.						
DR.	SBS TR.						
CH.	G.S.D.						
O. K.							
DATE	9-20-63						
SCALE							
GAS STANDARD DIMENSIONS STEEL BUTT-WELDING FITTINGS PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.				SUPERSEDED BY SHEET NO. 283158 SHEETS DRAWING NUMBER CHANGE			



PART NO.	CODE	FOR GAS LINE PIPE				SLEEVE					
		MAX. GWP PSI	NOMINAL SIZE	OUTSIDE DIA.	MINIMUM THICKNESS	OUTSIDE DIA.	INSIDE DIA.	MINIMUM THICKNESS	LENGTH	LONGITUDINAL WELD	WT. LBS.
A		800	3/4	1.050	.113	1.375	1.135	.120	4	SEAMLESS	.5
B		"	1-1/4	1.660	.140	2.000	1.760	.120	6	"	1.2
C	022206	"	2	2.375	.154	3	2-5/8	3/16	8	Full	3.9
D	022207	"	3	3.500	.148	4-1/8	3-3/4	3/16	8	"	5.2
E	022149	"	4	4.500	.148	5-1/8	4-3/4	3/16	8	"	6.8
F	022208	"	6	6.625	.1875	7-3/8	6-7/8	1/4	8	Tack	13
G	022184	"	8	8.625	.220	9-1/2	8-7/8	5/16	8	"	21
H		"	10	10.750	.259	11-3/4	11	3/8	8	"	31
J		500	10	10.750	.203	11-3/4	11	3/8	8	"	31
K		800	12	12.750	.3125	13-7/8	13	7/16	10	"	54
L	022185	500	12	12.750	.203	13-5/8	13	5/16	10	"	38
M		800	16	16	.401	17-1/4	16-1/4	1/2	14	"	105
N		500	16	16	.250	17	16-1/4	3/8	14	"	78
O		"	20	20	.28125	21-1/8	20-1/4	7/16	16	"	129
P		"	22	22	.3125	23-1/8	22-1/4	7/16	16	"	141
Q		"	24	24	.28125	25-1/4	24-1/4	1/2	16	"	177
R		"	26	26	.375	27-1/4	26-1/4	1/2	16	"	190

ALL DIMENSIONS IN INCHES.

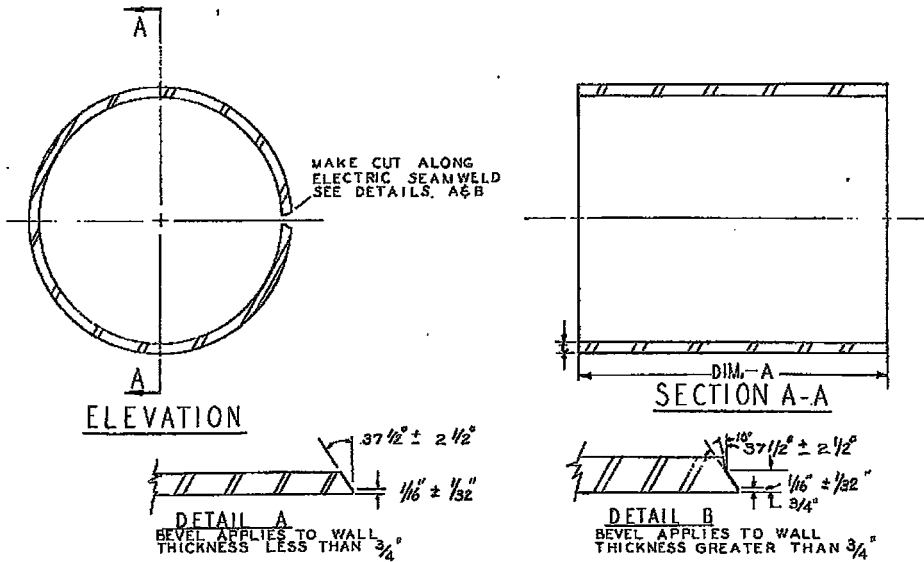
PARTS A & B TO BE MADE OF HOT DRAWN STEEL TUBING, MS-1
TENSILE STRENGTH OF STEEL FOR SLEEVES 60,000 PSI.

ORDER SLEEVE AS FOLLOWS:-

"WELDING SLEEVE FOR _____ INCH O.D. GAS LINE PIPE, MAX. GWP _____ PSI, PART NO. _____ AND
CODE NO. _____ AS PER MS-1102"

IF FULL LONGITUDINAL WELD IS WANTED ON SLEEVES FOR 8" TO 26" PIPE SPECIFY ON ORDER

APPROVED	BY	WELDING SLEEVES FOR STEEL GAS MAINS PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CAL.	SUPERSEDES
DATE	SCALE		SUPERSEDED BY
1-4-45	NONE		CHART NO.
			DRAWING NUMBER
			081439



DESIGN CATEGORY AND PRESSURE	NOMINAL PIPE SIZE	LENGTH DIM. "A"	THICKNESS DIM. "L"	MATERIAL
I, II (0-175 P.S.I.)	4"-16"	12"	EQUAL TO PIPELINE	SEE TABLE BELOW
	18"-36"	18"		
III, IV (176-720 P.S.I.)	4"	12"	1.42 TIMES PIPELINE THICKNESS	
	6"-16"	12"		
	18"-36"	18"		
V, VI (721-1040 P.S.I.)	4"-16"	12"		
	18"-36"	18"		

- DESIGN BASED ON G.O. 112-A, PAR. 8411 STEEL PIPE DESIGN FORMULA FOR TYPE "C" CONSTRUCTION. CATEGORY II THRU VI IS DESIGNED FOR 100% LONGITUDINAL STRENGTH OF PIPELINE.
- ENDS MAY BE EITHER MACHINE OR FLAME CUT. ALL FLAME CUTS SHALL BE GROUND TO REMOVE OXIDES AND PRESENT A CLEAN SURFACE FOR WELDING.
- THE MATERIAL SHALL BE FREE FROM INJURIOUS DEFECTS, SUCH AS GOUGES, ARC BURNS, CHIPS, AND DENTS AND SHALL HAVE A WORKMANLIKE FINISH.
- WHEN ORDERING, SPECIFY IF SLEEVE IS TO BE SPLIT ON ONE OR TWO SIDES.
- WHEN INSTALLING, ANY UNDERLYING WELD BEADS INTERFERING WITH FIT-UP SHALL BE GROUND SMOOTH.
- YIELD STRENGTH OF PIPE SLEEVE MATERIAL SHALL BE AT LEAST EQUAL TO THE YIELD STRENGTH OF PIPE MATERIAL.
- SLEEVE TO FIT OVER EXTERNAL DIAMETER OF PIPE.

PIPE MATERIAL	NORMAL USE	SLEEVE MATERIAL
A.P.I.-5L GRD. B PIPE	THRU 4" PIPE	EQUAL TO PIPE
A.P.I.-5LX GRD. X 42	6" - 16" PIPE	
A.P.I.-5LX GRD. X 42	18" - 36" PIPE	EQUAL TO PIPE OR ASTM-A-242 50,000 P.S.I. MIN. YIELD STRENGTH KAISALOY OR TRI-TEN
A.P.I.-5LX GRD. X 52		

OUTSIDE DIA. AT BEVEL	INSIDE DIA. AT ENDS	WALL THICKNESS	OUT-OF-ROUNDNESS	CIRCUMFERENTIAL	LENGTH
± 1/8"	± 1/8"	± 12.5%	± 1/16"	+ 9/32" - 3/32"	± 1/4"

APPROVED	CHG.	DATE	DESCRIPTION	BY	CHK.	APPROV.
	3	8-65	CORRECTION TO NOTES			
	2	4-8-65	ADDED NOTE 7			
	1	12-11-64	CHANGED MATERIAL NOTE			

SUPERV. BY	
DSGN.	
DR. R. WALLER	
CH.	
O.K.	
DATE	SCALE
7-6-64	NONE

GAS STANDARD

GAS MAIN WELDING SLEEVES

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

SUPERSEDES	083699
SUPERSEDED BY	
SHEET NO.	SHEETS
283226	3
DRAWING NUMBER	CHANGE

Nominal Size (Inches)	Wall Thickness (Inches)	Design Pressure (psi) By Construction Types							
		Grade B Yield 35,000 psi				Yield 42,000 psi			
		A	B	C	D	A	B	C	D
3/4	.113	5424	4520	3767	3013				
1	.133	5097	4247	3540	2832				
1-1/4	.140	4250	3542	2952	2361				
1-1/2	.145	3846	3205	2671	2137				
2	.154	3267	2723	2269	1815				
3	.216	3110	2592	2160	1728				
4	.237	2655	2212	1844	1475				
6	.280	2130	1775	1479	1183				
6	.432	3286	2738	2282	1826				
8	.322	1881	1568	1307	1045				
8	.500	2921	2434	2029	1623				
10	.365	1711	1426	1189	951				
10	.500	2344	1954	1628	1302				
12	.375	1482	1235	1030	824				
12	.500	1976	1647	1373	1098	2372	1976	1647	1318
16	.375	1182	985	821	656	1417	1181	984	787
16	.500	1575	1313	1094	875	1890	1575	1313	1050
20	.375	945	787	656	525	1134	945	788	630
20	.500	1260	1050	875	700	1512	1260	1050	840
22	.375	859	716	591	477	1031	859	716	573
22	.500	1146	955	796	656	1375	1145	955	764
24	.375	788	656	547	438	945	788	656	525
24	.500	1050	875	730	584	1260	1050	875	700

1. For steel butt welding fittings operating at temperatures between 0° and 250° F.
2. Construction Type A and B values not to be used without clearance from Gas System Design Department.
3. For other allowable working pressures see ~~SP-1664~~ Appendix "B".

D-33

APPROVED BY									
CHG.		DATE		DESCRIPTION		CH		BY	
1		5-66		ADDED NOTE 3					
SUPERV. BY		GAS STANDARD		ALLOWABLE WORKING PRESSURES		DRAWING LIST			
DSGN.		STEEL BUTT-WELDING FITTINGS		PACIFIC GAS AND ELECTRIC COMPANY		SUPERSEDED			
DR.		SAN FRANCISCO, CAL.				SUPERSEDED BY			
CH.						SHEET NO.		SHEETS	
O.K.						DRAWING NUMBER		CHANGE	
DATE		SCALE				083792		1	
5-64									