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CHART 1

WELDING REPAIR SELECTION CHART FOR MAINS WITH MAXIMUM ALLOWABLE OPERATING PRESSURE OF 100 PSIG OR LESS

TYPE OF DEFECT	EXTENT OF DEFECT	PERMISSIBLE METHODS OF REPAIR	LIMITATIONS ON METHODS
1. MECHANICAL DAMAGE: NOTCHES, SCRATCHES GOUGES, GROOVES AND DENTS	A. DENT-LESS THAN 10% DISTORTION (1/8" FOR 4½" O.D. & SMALLER)	1. NO REPAIR REQUIRED.	NO NOTCHES, SCRATCHES, GOUGES OR GROOVES IN DENT.
	B. DENT-MORE THAN 10% DISTORTION (1/4" FOR 4½" OD AND SMALLER)	1. SLEEVING OR CANNING.	DENT MUST NOT PREVENT PROPER FIT UP.
		2. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED
	C. NOTCH, SCRATCH, GOUGE, GROOVE-LESS THAN 50% OF PIPE WALL THICKNESS	1. GRINDING	LESS THAN 10% DISTORTION OR DENT (1/8" FOR 4½" O.D. & SMALLER). PIPE WALL NOT TO BE REDUCED TO LESS THAN 50% OF ORIGINAL NOMINAL WALL THICKNESS.
	D. NOTCH, SCRATCH, GOUGE, GROOVE-MORE THAN 50% OF PIPE WALL THICKNESS.	1. GRINDING AND WELDING	LESS THAN 10% DISTORTION OR DENT (1/8" FOR 4½" O.D. & SMALLER). REPAIR NOT TO EXCEED 1/4 CIRCUMFERENCE OF PIPE NOR 5 SQUARE INCHES, NOT MORE THAN ONE REPAIR PER FOOT OF PIPE LENGTH.
		2. PATCHING	LESS THAN 10% DISTORTION OR DENT(1/8" FOR 4½" O.D. & SMALLER). PATCH NOT TO EXCEED ½ PIPE CIRCUMFERENCE. ON PIPE OVER 8⅝ O.D., LENGTH NOT OVER 10 PIPE DIAMETERS. A MINIMUM OF 3" CLEARANCE BETWEEN PATCHES.
		3. SLEEVING OR CANNING.	DENT MUST NOT PREVENT PROPER FIT UP.
		4. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED
2. CORROSION DAMAGE	A. DEPTH LESS THAN 50% OF PIPE WALL THICKNESS	1. NO REPAIR REQUIRED	
	B. DEPTH OVER 50% OF PIPE WALL THICKNESS BUT LESS THAN 80%-NO LEAKAGE.	1. GRINDING AND WELDING	REPAIR NOT TO EXCEED 1/4 CIRCUMFERENCE OF PIPE NOR 5 SQUARE INCHES, NOT MORE THAN ONE REPAIR PER FOOT OF PIPE LENGTH.
		2. PATCHING	PATCH NOT TO EXCEED ½ PIPE CIRCUMFERENCE. ON PIPE OVER 8⅝" O.D., LENGTH NOT OVER 10 PIPE DIAMETERS. A MINIMUM OF 3" CLEARANCE BETWEEN PATCHES.
		3. SLEEVING OR CANNING.	NO LIMITATIONS.
		4. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE
		5. LEAK CLAMPS	SEE GAS STD. B-53
	C. DEPTH 80% OF PIPE WALL THICKNESS OR MORE-INCLUDING LEAKING CORROSION PITS	1. PATCHING	SAME AS 2.B.2
		2. SLEEVING OR CANNING	NO LIMITATIONS.
		3. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE.
		4. LEAK CLAMPS	SEE GAS STD. B-53
		5. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
3. LEAKS IN WELD.	A. ALL	1. PATCHING	EXISTING FACILITIES ONLY SAME AS 2.B.2.
		2. SLEEVING OR CANNING	EXISTING FACILITIES ONLY.
		3. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE EXISTING FACILITIES ONLY.
4. NON-LEAKING CRACKS OR DEFECTS IN WELDS	A. ANY LONGITUDINAL WELD CRACK GREATER THAN 2" LONG, A BRANCH OR CIRCUMFERENTIAL WELD CRACK THAT IS MORE THAN 8% OF WELD LENGTH, OR A CRACK THAT PENETRATES EITHER THE ROOT OR SECOND BEAD.	1. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED. IF NOT FEASIBLE TO TAKE MAIN OUT OF SERVICE, INSTALL SLEEVE
	B. ANY LONGITUDINAL WELD CRACK LESS THAN OR EQUAL TO 2" LONG, A BRANCH OR CIRCUMFERENTIAL WELD CRACK LESS THAN OR EQUAL TO 8% OF WELD LENGTH, OR OTHER DEFECTS.	1. GRINDING OR FILL WELDING	IF CRACK PENETRATES EITHER THE ROOT OR SECOND BEAD, REPLACE PIPE SEGMENT
		2. PATCHING, SLEEVING OR CANNING	LIMITATIONS FOR PATCHES SAME AS 2.B.2
		3. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED
5. LEAKS IN BODY OF FITTING OR IN CLAMPS	A. ALL	1. CANNING	EXISTING FACILITIES ONLY
		2. REPLACE FITTING OR CLAMP	NO LIMITATIONS.

NOTE: FOR REPAIR PROCEDURES SEE PARAGRAPH 4 OF THIS GAS STANDARD AND THE FOLLOWING APPLICABLE GAS STANDARDS:

A-60, A-61 SLEEVING
A-62 MUELLER NIPPLE, LEAK PATCH
A-63 CANNING
A-64 PATCHING
B-53 LEAK REPAIR CLAMPS
D-22 ARC WELDING

(200,210)283906SH1.G24 04-25-88 DWH

REV	DATE	DESCRIPTION	DWN	CHKD	APVD
3	4-15-88	REVISED TYPE OF DEFECT NO.4 AND ALL OTHER ASSOCIATED COLUMNS	DWH		[redacted]
2	3-4-87	REVISED PAGE NO. FROM 5 TO 6			
1	4/20/84	REVISED 1.C.1, 1.D.2, 2.B, 2.B.2, 4.A, 4.B & 5.A.1. ADDED NOTE.			
0	1-20-77	ISSUE FOR USE			

APPROVED BY [redacted]

GM	
SUPV	GAS OPER.
DSGN	
DWN	[redacted]
CHKD	
OK	
DATE	9-24-76
SCALE	

PIPING-DATA SHEET

REPAIR REQUIREMENTS FOR DAMAGED OR LEAKING MAINS

GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

SUPERSEDES	084491 [illegible]
SUPERSEDED BY	
SHEET NO. 1 OF	3 SHEETS
DRAWING NUMBER	283906
REV	3
MICROFILM	

M4345

A-65
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CHART II

WELDING REPAIR SELECTIONS CHART FOR MAINS WITH MAXIMUM ALLOWABLE OPERATING PRESSURE GREATER THAN 100 PSIG BUT LESS THAN 20% OF SPECIFIED MINIMUM YIELD STRENGTH AND 500 PSIG

TYPE OF DEFECT	EXTENT OF DEFECT	PERMISSIBLE METHODS OF REPAIR	LIMITATIONS OF METHODS
1. MECHANICAL DAMAGE: NOTCHES, SCRATCHES, GOUGES, GROOVES AND DENTS.	A. DENT-LESS THAN 5% DISTORTION (3/8" FOR 6 5/8" O.D. AND SMALLER)	1. NO REPAIR REQUIRED	NO NOTCHES, SCRATCHES, GOUGES AND GROOVES IN DENT. NO WELDS AFFECTED.
	B. DENT-MORE THAN 5% DISTORTION. (3/8" FOR 6 5/8" OD AND SMALLER)	1. SLEEVING OR CANNING.	DENT MUST NOT PREVENT PROPER FIT UP. CANS NOT TO BE USED ON MAIN WITH MAOP OVER 400 PSIG
		2. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
	C. NOTCH, SCRATCH, GOUGE, GROOVE-DEPTH LESS THAN 10% OF PIPE WALL THICKNESS	1. GRINDING	PIPE WALL NOT TO BE REDUCED TO LESS THAN 90% OF NOMINAL PIPE WALL THICKNESS. DENT OR DISTORTION LESS THAN 5% OF O.D.
	D. NOTCH, SCRATCH, GOUGE, GROOVE-DEPTH BETWEEN 10% AND 30% OF PIPE WALL THICKNESS	1. GRINDING AND WELDING	DENT OF DISTORTION LESS THAN 5% OF O.D. (3/8" FOR 6 5/8" O.D. AND SMALLER). REPAIR NOT TO EXCEED 1/4 OF PIPE CIRCUMFERENCE NOR 4 SQUARE INCHES. NOT MORE THAN ONE REPAIR PER 5 PIPE DIAMETERS OF LENGTH.
		2. PATCHING	DENT OR DISTORTION LESS THAN 5% OF O.D. (3/8" FOR 6 5/8" O.D. AND SMALLER). PATCH NOT TO EXCEED 1/2 PIPE CIRCUMFERENCE. LENGTH NOT OVER 10 PIPE DIAMETERS ON PIPE OVER 8 5/8" O.D. A MINIMUM OF 3" CLEARANCE BETWEEN PATCHES.
		3. SLEEVING OR CANNING.	DENT MUST NOT PREVENT PROPER FIT UP. CANS NOT TO BE USED ON MAINS WITH MAOP OVER 400 PSIG
	E. NOTCH, SCRATCH, GOUGE, GROOVE-DEPTH MORE THAN 30% OF PIPE WALL THICKNESS.	1. PATCHING	PATCH NOT TO EXCEED 1/2 PIPE CIRCUMFERENCE. ON PIPE OVER 8 5/8" O.D., LENGTH NOT OVER 10 PIPE DIAMETERS, A MINIMUM OF 3" CLEARANCE BETWEEN PATCHES.
		2. SLEEVING OR CANNING.	DENT MUST NOT PREVENT PROPER FIT UP. CANS NOT TO BE USED ON MAINS WITH MAOP OVER 400 PSIG
		3. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
2. CORROSION DAMAGE	A. DEPTH LESS THAN 20% OF PIPE WALL THICKNESS	1. NO REPAIR REQUIRED	
	B. DEPTH BETWEEN 20% AND 30% OF PIPE WALL THICKNESS	1. GRINDING AND WELDING	REPAIR NOT TO EXCEED 1/4 PIPE CIRCUMFERENCE NOR 4 SQUARE INCHES. NOT MORE THAN ONE REPAIR PER 5 PIPE DIAMETERS OF LENGTH
		2. PATCHING	SAME AS 1.E.1.
		3. SLEEVING	NO LIMITATIONS.
		4. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE
	C. DEPTH OVER 30% OF PIPE WALL THICKNESS BUT LESS THAN 80% -NO LEAKAGE	1. PATCHING	SAME AS 1.E.1.
		2. SLEEVING	NO LIMITATIONS.
		3. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE
	D. DEPTH 80% OF PIPE WALL THICKNESS OR MORE -INCLUDING LEAKING CORROSION PITS	1. PATCHING	SAME AS 1.E.1.
		2. SLEEVING	NO LIMITATIONS
		3. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE
		4. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
3. LEAKS IN WELDS	A. ALL	1. PATCHING	SAME AS 1.E.1. EXISTING FACILITIES ONLY
		2. SLEEVING OR CANNING	EXISTING FACILITIES ONLY CANS NOT TO BE USED ON MAINS WITH MAOP OVER 400 PSIG
		3. MUELLER SAVE-A-VALVE NIPPLE	2" MAXIMUM SIZE EXISTING FACILITIES ONLY
4. NON-LEAKING CRACKS OR DEFECTS IN WELDS	A. ANY LONGITUDINAL WELD CRACK GREATER THAN 2" LONG, A BRANCH OR CIRCUMFERENTIAL WELD CRACK THAT IS MORE THAN 8% OF WELD LENGTH, OR A CRACK THAT PENETRATES EITHER THE ROOT OR SECOND BEAD.	1. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED. IF NOT FEASIBLE TO TAKE MAIN OUT OF SERVICE, INSTALL SLEEVE.
	B. ANY LONGITUDINAL WELD CRACK LESS THAN OR EQUAL TO 2" LONG, A BRANCH OR CIRCUMFERENTIAL WELD CRACK LESS THAN OR EQUAL TO 8% OF WELD LENGTH, OR OTHER DEFECTS.	1. GRINDING AND FILL WELDING	IF CRACK PENETRATES EITHER THE ROOT OR SECOND BEAD, REPLACE PIPE SEGMENT
		2. PATCHING, SLEEVING OR CANNING	LIMITATIONS FOR PATCHES SAME AS 1.E.1 CANS NOT TO BE USED ON MAINS WITH MAOP OVER 400 PSIG
		3. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED
5. LEAKS IN BODY OF FITTINGS OR IN CLAMPS	A. ALL	1. REPLACE FITTING OR CLAMP	NO LIMITATIONS
		2. CANNING	EXISTING FACILITIES ONLY. NOT TO BE USED ON MAINS WITH MAOP OVER 400 PSIG.

NOTE: FOR REPAIR PROCEDURES SEE PARAGRAPH 4 OF THIS GAS STANDARD AND THE FOLLOWING APPLICABLE GAS STANDARDS:

A-60 SLEEVING
A-62 MUELLER NIPPLE, LEAK PATCH
A-63 CANNING
A-64 PATCHING
D-22 ARC WELDING

[200,210]283906SH2.G24 04-25-88 DWH

REV	DATE	DESCRIPTION
3	4-15-88	REVISED TYPE OF DEFECT NO. 4 AND ALL OTHER ASSOCIATED COLUMNS
2	3-4-87	REVISED PAGE NO. FROM 6 TO 7
1	4-20-84	ENTIRE CHART REVISED ADDED 2.D, 4. B.3, AND NOTE
0	1-20-77	ISSUE FOR USE

APPROVED BY [redacted]

DWN [redacted] CHKD [redacted] APVD [redacted]

GM
SUPV GAS OPER.
DSGN
DWN [redacted]
CHKD
OK

DATE 9-24-76
SCALE

PIPING-DATA SHEET

REPAIR REQUIREMENTS FOR DAMAGED OR LEAKING MAINS

GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

SUPERSEDES 084491 PG 5
SUPERSEDED BY
SHEET NO. 2 OF 3 SHEETS
DRAWING NUMBER 283906
REV 3
MICROFILM

A-65

PAGE 8

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CHART III

REPAIR SELECTION CHART FOR LINES WITH AN M.A.O.P. OF 20% OR MORE OF SPECIFIED MINIMUM YIELD STRENGTH, OR 500 PSI OR GREATER

TYPE OF DEFECT	EXTENT OF DEFECT	PERMISSIBLE METHODS OF REPAIR	LIMITATIONS ON METHODS
1. MECHANICAL DAMAGE: NOTCHES, SCRATCHES, GOUGES, GROOVES, DENTS.	A. DENT-LESS THAN 2% DISTORTION (1/4" FOR O.D. LESS THAN 12.750").	1. NO REPAIR REQUIRED.	NO NOTCHES, SCRATCHES, GOUGES, AND GROOVES IN DENT. NO WELDS AFFECTED BY DENT.
	B. DENT-MORE THAN 2% DISTORTION (1/4" FOR O.D. LESS THAN 12.750").	1. SLEEVING.	DENT MUST NOT PREVENT PROPER FIT UP. IF DENT AFFECTS A WELD, REPAIR AS IN 1.B.2
		2. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
	C. NOTCH, SCRATCH, GOUGE, GROOVE-DEPTH LESS THAN 10% OF PIPE WALL THICKNESS AND LESS THAN 8% OF PIPE W.T. FOR WELDED PIPE 20" O.D. OR LARGER	1. GRINDING	PIPE WALL NOT TO BE REDUCED TO LESS THAN 90% OF NOMINAL WALL THICKNESS (92% ON WELDED PIPE 20" O.D. OR LARGER) DENT OR DISTORTION LESS THAN 2% OF O.D. (1/4" FOR O.D. LESS THAN 12.750").
	D. NOTCH, SCRATCH, GOUGE, GROOVE-DEPTH 10% OR MORE OF PIPE WALL THICKNESS. DESIGN PRESSURE LESS THAN 40% SMYS.	1. SLEEVING.	DENT OR DISTORTION MUST NOT PREVENT PROPER FIT UP.
	E. NOTCH, SCRATCH, GOUGE, GROOVE-DEPTH 10% OR MORE OF PIPE WALL THICKNESS. DESIGN PRESSURE 40% SMYS OR MORE. (8% OR MORE FOR WELDED PIPE 20" OR LARGER)	1. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED. IF NOT FEASIBLE TO TAKE MAIN OUT OF SERVICE, REPAIR WITH SLEEVE AS IN 1.B.1
2. CORROSION DAMAGE	A. DEPTH 10% OR LESS OF PIPE WALL THICKNESS*	1. NO REPAIR REQUIRED.	
	B. DEPTH OVER 10% OF PIPE WALL THICKNESS BUT LESS THAN 80%-NO LEAKAGE.	1. PATCHING	PIPE OF NOT MORE THAN 40,000 PSI SMYS. LENGTH OR WIDTH OF PATCH NOT TO EXCEED 1/4 PIPE CIRCUMFERENCE. A MINIMUM OF 3" CLEARANCE BETWEEN PATCHES.
		2. SLEEVING	NO LIMITATIONS.
		3. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
	C. DEPTH 80% OF PIPE WALL THICKNESS OR MORE-INCLUDING LEAKING CORROSION PITS.	1. PATCHING	SAME AS 2.B.1.
		2. SLEEVING	NO LIMITATIONS.
		3. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
3. LEAKS IN WELDS	A. ALL	1. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED. IF NOT FEASIBLE TO TAKE MAIN OUT OF SERVICE REPAIR AS IN 1.B.1
4. NON-LEAKING CRACKS OR DEFECTS IN WELDS.	A. ANY LONGITUDINAL WELD CRACK GREATER THAN 2" LONG, A BRANCH OR CIRCUMFERENTIAL WELD CRACK MORE THAN 8% OF WELD LENGTH, OR A CRACK THAT PENETRATES EITHER THE ROOT OR SECOND BEAD	1. REPLACE IF FEASIBLE TO REMOVE FROM SERVICE OR SLEEVE	ENTIRE SECTION AFFECTED MUST BE REMOVED. IF NOT FEASIBLE TO TAKE MAIN OUT OF SERVICE REPAIR AS IN 1.B.1
	B. ANY LONGITUDINAL WELD CRACK LESS THAN OR EQUAL TO 2", A BRANCH OR CIRCUMFERENTIAL WELD CRACK LESS THAN OR EQUAL TO 8% OF WELD LENGTH, OR OTHER DEFECTS	1. GRINDING OR FILL WELDING	AT LEAST 1/8" WALL THICKNESS REMAINING. FOR MAXIMUM HOOP STRESS PERMITTED DURING WELDING SEE PARAGRAPH 2 OF THIS GAS STANDARD. INSPECT REPAIR. IF DEFECT REMAINS, REPAIR AS IN 4.A.1.
		2. SLEEVING	NO LIMITATIONS.
		3. REPLACE SEGMENT OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED.
5. LEAKS IN BODY OF FITTINGS OR IN CLAMPS	A. ALL	1. REPLACE FITTING OR CLAMP.	X-RAY TIE-IN WELDS OF REPLACED FITTINGS.

* THE ALLOWABLE DEPTH IS LESS FOR ASTM A-381 MATERIAL. CONTACT GAS SYSTEM DESIGN.

NOTE: FOR REPAIR PROCEDURES SEE PARAGRAPH 4 OF THIS GAS STANDARD OR THE FOLLOWING APPLICABLE GAS STANDARDS:

A-60 SLEEVING
A-64 PATCHING
D-22 ARC WELDING

[200,210]283906SH3.G24 04-22-88 DWH

REV	DATE	DESCRIPTION
4	4-15-88	REVISED TYPE OF DEFECT NO. 4 AND ALL OTHER ASSOCIATED COLUMNS
3	3-4-87	REVISED PAGE NO. FROM 7 TO 8
2	4-20-84	REVISED ENTIRE CHART. ADDED 2.B.3, 2.C.1, 2.C.2, FOOTNOTE & REFERENCE TO G.S. A-60 & A-64.
1	12-28-76	REMOVED REF TO TRANSMISSION LINES FROM TITLE, CHG'D "DP" TO DESIGN PRESSURE, ADDED 1.A & 1.B.

DWN [redacted] CHKD [redacted] APVD [redacted]

APPROVED BY [redacted]

GM GAS OPERATION
SUPV
DSGN
DWN [redacted]
CHKD [redacted]
OK
DATE 7-14-83
SCALE

PIPING-DATA SHEET

REPAIR REQUIREMENTS FOR DAMAGED OR LEAKING MAINS

GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

SUPERSEDES 084491, SH6
SUPERSEDED BY
SHEET NO. 3 OF 3 SHEETS
DRAWING NUMBER 283906
REV 4
MICROFILM

N4345