

CHART I

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 METHOD
1 MECHANICAL DAMAGE NOTCHES SCRATCHES GOUGES GROOVES AND DENTS	A DENT LESS THAN 10% DISTORTION (1/2 FOR 4 1/2 OD & SMALLER)	1 NO REPAIR REQUIRED	NO NOTCHES SCRATCHES GOUGES OR GROOVES
	B DENT MORE THAN 10% DISTORTION (1/2 FOR 4 1/2 OD & SMALLER)	1 SLEEVING OR CANNING	DENT MUST NOT PREVENT PROPER FIT UP
		2 REMOVE SECTION OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED
	C GOUGES OR OTHER LESS THAN 50% OF PIPE WALL THICKNESS	1 GRINDING	LESS THAN 10% DISTORTION OR DENT (1/2 FOR 4 1/2 OD & SMALLER) PIPE WALL NOT TO BE REDUCED TO LESS THAN 50% THICKNESS
D GOUGES OR OTHER MORE THAN 50% OF PIPE WALL	1 GRINDING & WELDING	1 GRINDING & WELDING	LESS THAN 10% DISTORTION OR DENT (1/2 FOR 4-1/2 OD & 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 (1/2 FOR 4-1/2 OD & SMALLER)
	3 SLEEVING OR CANNING	3 SLEEVING OR CANNING	DENT MUST NOT PREVENT PROPER FIT UP
	4 REMOVE SECTION OF PIPE	4 REMOVE SECTION OF PIPE	ENTIRE SECTION AFFECTED MUST BE REMOVED
2 CORROSION DAMAGE	A DEPTH LESS THAN 50% OF PIPE WALL	1 NO REPAIR REQUIRED	
	B DEPTH MORE THAN 50% OF PIPE WALL	1 GRINDING & WELDING	REPAIR NOT TO EXCEED 1/4 CIRCUMFERENCE OF PIPE NOR 5 SQUARE INCHES NOT MORE THAN ONE REPAIR PER FOOT OF PIPE
		2 PATCHING	NO LIMITATION
		3 SLEEVING OR CANNING	NO LIMITATION
		4 MUELLER NIPPLE	2 MAXIMUM SIZE
5 LEAK CLAMPS	5 LEAK CLAMPS	SEE STD B 53	
3 LEAKS IN WELDS	A POROSITY OR PINHOLES	1 PATCHING	EXISTING FACILITIES ONLY
		2 SLEEVING OR CANNING	EXISTING FACILITIES ONLY
		3 MUELLER NIPPLE	2 MAXIMUM NIPPLE SIZE EXISTING FACILITIES ONLY
4 CRACKED WELDS	A JOINT WELD	1 SLEEVING OR CANNING	EXISTING FACILITIES ONLY
	B SEAM WELD	1 PATCHING SLEEVING OR CANNING	NO LIMITATION
5 LEAKS IN BODY OF FITTINGS OR IN CLAMPS		1 CANNING OR ENCASING	NO LIMITATION
		2 REMOVE FITTING	NO LIMITATION

DESIGNED BY							
DATE	0	1	0	7			
DESCRIPTION	PIPING-DATA SHEET						
	WELDING AND REPAIRS ON LINES UNDER PRESSURE						
	GAS STANDARD						
	PACIFIC GAS AND ELECTRIC COMPANY						
	S N C S C O C A F O A						
SUPERSEDES	084491 Pg 4						
SUPERSEDED BY							
SHEET NO	1 OF 3 SHEETS						
283906							()
SCAL							
9 24 76							

CHART II

WELDING REPAIR SELECTION 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 TO DEFECT	PERMISSIBLE METHODS OF REPAIR	LIMITATIONS ON METHOD
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. NO WELDS AFFECTED.
	B. DENT-MORE THAN 5% DISTORTION (3/8" FOR 6-5/8" O.D. AND SMALLER)	1. SLEEVE OR CAN (MAIN TO BE TAPPED SO THAT SLEEVE OR CAN CARRIES PRESSURE) 2. REMOVE SECTION OF PIPE.	CANS OTHER THAN IN STD. A-63 REQUIRE APPROVAL FROM GAS SYSTEM DESIGN DEPT. DENT MUST NOT PREVENT PROPER FIT UP. ENTIRE SECTION AFFECTED MUST BE REMOVED.
	C. GOUGES OR OTHER-LESS THAN 10% OF PIPE WALL	1. GRINDING	LESS THAN 5% DISTORTION OR DENT (3/8" FOR 6-5/8" O.D. & SMALLER). PIPE WALL NOT TO BE REDUCED TO LESS THAN 90% THICKNESS.
	D. GOUGES OR OTHER-BETWEEN 10% AND 30% OF PIPE WALL.	1. GRINDING & WELDING 2. PATCHING 3. SLEEVING OR CANNING; MAIN TO BE TAPPED SO SLEEVE CARRIES PRESSURE.	LESS THAN 5% DISTORTION OR DENT (3/8" FOR 6-5/8" O.D. & 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. PATCH NOT TO EXCEED 1/2 PIPE CIRCUMFERENCE. NO LIMIT ON LENGTH FOR PIPE THRU 8-5/8" O.D. LENGTH NOT OVER 10 DIAMETERS ON PIPE OVER 8-5/8" O.D. LESS THAN 5% DISTORTION OR DENT (3/8" FOR 6-5/8" O.D. & SMALLER). 6" MINIMUM CLEARANCE. CANS OTHER THAN IN A-63 REQUIRE APPROVAL FROM GAS SYSTEM DESIGN DEPT. DENT MUST NOT PREVENT PROPER FIT UP.
	E. GOUGES OR OTHER-OVER 30% OF PIPE WALL.	1. PATCHING 2. SLEEVING OR CANNING 3. REMOVE SECTION OF PIPE	SAME AS I. D. 2. SAME AS I. D. 3. ENTIRE SECTION AFFECTED MUST BE REMOVED
2. CORROSION DAMAGE	A. DEPTH LESS THAN 20% OF PIPE WALL	1. NO REPAIR REQUIRED.	
	B. DEPTH BETWEEN 20% AND 30% OF PIPE WALL.	1. GRINDING & WELDING. 2. PATCHING 3. SLEEVING 4. MUELLER NIPPLE	SAME AS I. D. 1. SAME AS I. D. 2. NO TAPPING OF MAIN REQUIRED. NO LIMITATION. NO TAPPING OF MAIN REQUIRED. 2" MAXIMUM SIZE.
	C. DEPTH OVER 30% OF PIPE WALL.	1. PATCHING 2. SLEEVING 3. MUELLER NIPPLE	SAME AS I. D. 2. NO TAPPING OF MAIN REQUIRED. NO LIMITATION. NO TAPPING OF MAIN REQUIRED. 2" MAXIMUM SIZE.
3. LEAKS IN WELDS	A. POROSITY OR PINHOLES.	1. PATCHING	SAME AS I. D. 2. EXISTING FACILITIES ONLY.
		2. SLEEVING OR CANNING	EXISTING FACILITIES ONLY. CANS ONLY PER A-63
		3. MUELLER NIPPLE	2" MAXIMUM SIZE. EXISTING FACILITIES ONLY.
4. CRACKED WELDS	A. CIRCUMFERENTIAL WELDS	1. SLEEVING OR CANNING	EXISTING FACILITIES ONLY. CANS ONLY PER A-63
	B. LONGITUDINAL SEAM WELDS	1. PATCHING 2. SLEEVING OR CANNING	PATCH MUST EXTEND TO 1/2 OF PIPE CIRCUMFERENCE. NO LIMIT ON LENGTH OF PATCH FOR PIPE THRU 8-5/8" O.D. LENGTH NOT TO EXCEED 10 DIAMETERS ON PIPE OVER 8-5/8" O.D. ONLY CANS SPECIFIED IN A-63.
5. LEAKS IN BODY OF FITTINGS OR IN CLAMPS.		1. REMOVE FITTING	NO LIMITATION.
		2. CANNING OR ENCASING	APPROVAL REQUIRED BY GAS SYSTEM DESIGN DEPARTMENT.

APPROVED BY									
D 1-20-77		Issue for use							
CHG	DATE	DESCRIPTION				BY	CH.	APPD.	GM
SUPV. BY	GAS OPER.	<p align="center">PIPING - DATA SHEET WELDING AND REPAIRS ON LINES UNDER PRESSURE GAS STANDARD PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>				SUPERSEDES 084491 Pg 5			
DSGN.						SUPERSEDED BY			
DR.						SHEET NO. 2 OF 3 SHEETS			
CH.						283906		CHANGE 0	
O.K.		DATE 9-24-76		SCALE					

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

TYPE OF DEFECT	EXTENT OF DEFECT	PERMISSIBLE METHODS OF REPAIR	LIMITATIONS ON METHOD
1. MECHANICAL DAMAGE: NOTCHES, SCRATCHES, GOUGES, GROOVES, DENTS, OR LEAKAGE CAUSED BY OTHER THAN CRACKED WELDS, OR CORROSION.	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. NO WELDS AFFECTED BY DENT.
	B. DENT-MORE THAN 2% DISTORTION (1/4" FOR O.D. LESS THAN 12.750").	1. SLEEVING-MAIN TO BE TAPPED SO THAT FULL ENCIRCLEMENT SLEEVE CARRIES PRESSURE.	DENT MUST NOT PREVENT PROPER FIT UP. ALSO SEE I. D. 1. IF DENT AFFECTS A WELD, REPAIR AS IN I.B.2., WHERE FEASIBLE.
		2. TAKE SEGMENT OUT OF SERVICE, CUT OUT CYLINDRICAL PIECE OF PIPE, REPLACE IT WITH PIPE OF SIMILAR OR GREATER DESIGN STRENGTH.	X-RAY TIE IN WELDS. IF NOT FEASIBLE TO TAKE MAIN OUT OF SERVICE, REPAIR WITH SLEEVE AS IN I.B.1.
	C. GOUGE OR OTHER-DEPTH LESS THAN 10% OF PIPE WALL.	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 PIPE LESS THAN 12.750" O.D.).
	D. GOUGE OR OTHER-DEPTH OVER 10% OF PIPE WALL. DESIGN PRESSURE LESS THAN 40% S.M.Y.S.	1. SLEEVING-MAIN TO BE TAPPED SO THAT FULL ENCIRCLEMENT SLEEVE CARRIES PRESSURE.	DENT OR DISTORTION MUST NOT PREVENT PROPER FIT UP. MAXIMUM SPACE BETWEEN PIPE AND SLEEVE IS 1/16"; WELDS UNDER SLEEVE GROUND SMOOTH. BACK-UP STRIP BEHIND LONGITUDINAL WELDS. PRESSURE TO BE REDUCED TO PRODUCE STRESS LESS THAN 20% S.M.Y.S. DURING REPAIR.
E. GOUGE OR OTHER-DEPTH OVER 10% OF PIPE WALL. LEAKAGE, DAMAGE TO LONGITUDINAL OR CIRCUMFERENTIAL WELD, OR DESIGN PRESSURE OF 40% OR MORE S.M.Y.S.	1. SAME AS I.B.2.	SAME AS I.B.2.	
2. CORROSION DAMAGE (SHORT, LOCALIZED AREAS OF CORROSION WITH A DEPTH OF MORE THAN 10% OF THE PIPE WALL MAY NOT REQUIRE REPAIR. EACH SUCH CASE MUST BE REVIEWED WITH GAS SYSTEM DESIGN DEPT.)	A. DEPTH LESS THAN 10% OF PIPE WALL.	1. NO REPAIR REQUIRED.	
	B. DEPTH OVER 10% OF PIPE WALL (INCLUDING CORROSION PITS WHICH ARE CAUSING LEAKAGE) DESIGN PRESSURE LESS THAN 40% S.M.Y.S.	1. PATCHING. (SEE STD. A-64)	PIPE OF NOT MORE THAN 40,000 P.S.I., S.M.Y.S., THE REPAIR MAY BE MADE BY FILLET WELDING OVER THE PITTED AREA A STEEL PLATE PATCH WITH ROUNDED CORNERS, OF THE SAME OR GREATER THICKNESS THAN THE PIPE, AND NOT MORE THAN ONE HALF THE DIAMETER OF THE PIPE SIZE.
		2. SLEEVING.	SAME AS I.B.1. NO TAPPING OF MAIN REQUIRED.
C. DESIGN PRESSURE OF 40% OR MORE OF S.M.Y.S.	1. SAME AS I.B.2.	SAME AS I.B.2.	
3. LEAKS IN WELDS.	A. ALL	1. SAME AS I.B.2.	SAME AS I.B.2.
4. CRACKS OR DEFECTS IN WELD	A. CRACK THAT IS MORE THAN 2" LONG OR PENETRATES EITHER THE ROOT OR SECOND BEAD.	1. SAME AS I.B.2.	SAME AS I.B.2.
	B. OTHER SMALL DEFECTS.	1. DEFECT REMOVED AND REWELDED.	AT LEAST 1/8" WALL THICKNESS REMAINING. PRESSURE TO BE REDUCED TO PRODUCE STRESS THAT IS NOT MORE THAN 20% OF S.M.Y.S. OF THE PIPE DURING REPAIR. INSPECT REPAIR, IF DEFECT REMAINS REPAIR AS IN I.B.2.
5. LEAKS IN BODY OF FITTINGS OR IN CLAMPS.		1. REPLACE FITTINGS.	X-RAY TIE-IN WELDS

APPROVED BY							
CHG	DATE	DESCRIPTION	BY	CH.	APPD.	GM	
	12-28-76	Removed ref. to transmission lines from title, Chg'd "DP" to Design Pressure, Added I.A. & I.B.					

SUPV. BY GAS OPER.	<p align="center">PIPING - DATA SHEET WELDING AND REPAIRS ON LINES UNDER PRESSURE GAS STANDARD PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>	SUPERSEDES 084491, SH. 6
DSGN.		SUPERSEDED BY
DATE		SHEET NO. 3 OF 3 SHEETS
SCALE		283906
4-17-73		CHANGE /