

PROCEDURES

STEEL PIPE REPAIRS

6.0 PURPOSE (192.309)

All known leaks and any imperfections or damages to the pipe metal affecting its serviceability for the use intended will be repaired or replaced. All repairs shall meet the following requirements as stated in the appropriate sections:

- A. Testing, Procedure H-3
- B. Cathodic Protection, Section L
- C. Purging, Procedure H-5
- D. Wrapping, Section I

6.1 SAFETY

Safety procedures shall be followed whenever working in gaseous atmospheres. **Refer to Section B-6**, for procedure to be taken to prevent accidental ignition. Frequent review of that material is recommended.

Particular attention shall also be given to use of personal safety equipment. **Refer to Section B-2.**

6.2 REPAIR CLAMPS

Steel gas line leaks can be temporarily or permanently repaired by using the appropriate leak repair clamp.

- A. Permanent Bolt-On Leak Repair Clamps.

Steel gas lines 8" or smaller with intended operating pressure of 60 psig or less will be considered permanently repaired using the appropriate bolt-on clamp using the following guidelines:

1. Bolt-on clamps must pass a soap test.
2. All clamps shall be wrapped using Trenton Temcoat grease wrap & polyply wrap or other approved method.
3. Cathodic protection requirements should be verified.

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- B. Bolt-On Repair Clamp Installation Procedure:
1. Clean all around pipe to bare metal at location where clamp is to be installed.
 2. Select clamp as shown on selection chart of this section.
 3. Select clamp wide enough to cover adjacent corrosion pits.
 4. Assure that gasket is properly placed and fitted.
 5. Lubricate gasket with a rubber lube solution or LPS #1 Lubricant.
 6. Attach approved ground strap.
 7. Center clamp over leak.
 8. If clamp has more than one bolt, tighten bolts evenly.
 9. Soap test to assure leakage has been stopped.
 10. Primer and wrap clamp and adjoining steel pipe.

NOTE: Bolt-on clamps shall be considered temporary repairs when used for the following conditions:

- 1) Welds
- 2) Seams
- 3) Tears or deformed pipe
- 4) Weld ells

6.3 LINE STOPPER FITTINGS

All line stopper fittings shall be welded and operated by qualified personnel only. If main can not be shut down, install a bypass.

- A. Select location for installing fitting or fittings on main.
1. If pipe is leaking, attempt to make temporary repair, or select a location for installation of the fitting that is out of the gaseous atmosphere

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- B. Install approved ground strap.
- C. Fitting(s) should be installed on clean pipe that is free of corrosion or excessive pitting.
- D. It is recommended that fittings should be installed at least one pipe diameter from a weld. Fittings shall not be installed on a weld under any circumstance.
- E. Flash bell hole before welding starts.

Refer to Section M-1 for detailed procedures in using stopple equipment.

6.4 VALVES

This procedure shall be used only when main can be shut down.

- A. Close valve(s). **Refer to Section G for approved procedure for operation of valves.**
- B. Purge down section of line to be replaced.
- C. Install new section line. **Refer to Section D-3 for welding procedures.**
- D. Purge new section through purge nipple. **Refer to Section H-5.**
- E. Line pack new section and soap test.
- F. Restore new section back to operation.

6.5 PATCHES

- A. Patches are not allowed on lines operating above a hoop stress of 20% of SMYS.
- B. Patches shall be made of steel and have a design pressure at least equal to the design level of the pipe.
- C. Patches shall be round or have corners with radius of not less than 1”.

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- D. At least 3" of sound metal exists between the welds of adjacent patches fillet welds or bands.
- E. The length of patch is not limited along the longitudinal axis of pipe.

6.6 SHIELDS AND SLEEVES

Shields and sleeves shall be made of steel and have a design pressure at least equal to the design level of the pipe. This method is used for the following types of repairs:

- A. All types of leaks including corrosion, damage from external force, defective (including cracked) circumferential and longitudinal welds and cracked parent metal.
- B. Corroded areas.
- C. Dents, when the stress at design level is below 20% of SMYS, and are less than 1/4" deep in pipe 8" or less in diameter.
- E. Hard spots associated with other defects when stress at design level is less than 20% of SMYS.
- F. Defect (but not cracked) circumferential welds including those on which unsuccessful repair attempts by grinding and re-welding have been made.
- G. Welding bands, weld reinforcing sleeves, and canopies are to be installed so that the two halves fit together and fit around the pipe onto which they are to be welded. The gap at the root between the parts to be joined by welding shall not exceed 1/16" except at the longitudinal weld where the gap may be as much as 1/8".

6.7 GRINDING

The use of grinding as a method of repair is acceptable as long as the following conditions are met:

- A. The entire imperfection (scratch, gouge, arc burn) is removed.
- B. The remaining wall thickness, after grinding, must at least be equal to the nominal thickness required for the design pressure of the pipeline.

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6.8 WELD REPAIRS

- A. Defect in unacceptable welds may be repaired one time.
- B. Each weld that is repaired must have the defect removed. Before welding has commenced, pipe may be preheated between 300° F and 400° F.
- C. The welding performed in making repairs shall be visually inspected. The weld repair shall meet the standards of acceptability of API 1104.
- D. On existing lines operating at a hoop stress of less than 40% of SMYS welds may be repaired using a full encirclement weld reinforcing sleeve of appropriate design and using approved welding procedure.
- E. Non-destructive testing involving repairs or cutouts shall consist of two X-rays, the first one showing the defect, and the second one showing the sound weld as accepted by a qualified welding inspector or supervisor.

6.9 ARC BURN

On line pipe, any arc burn outside the weld area that cannot be consumed by the finish weld shall be cut out.

In situations involving weld fittings such as valves, insulators, line stopper fittings, etc., it may be desirable to attempt a repair in an effort to salvage the fitting. Arc burns can be a serious defect regardless of size and should be treated as such. Arc burns may contain minute cracks hardly visible to the naked eye. These small cracks may be present in the arc burn or beneath the arc burn in the heat-affected zone.

The following is a step-by-step procedure for examining and repairing arc burns:

- Step #1 - File down arc burn area blending it with the contour of the pipe until visual evidence of the arc burn is completely removed.
- Step #2 - Etch arc burn area with a 20% (by volume) solution of ammonium sulfate.
- Step #3 - Visual inspection of the arc burn area should etch out to the same color. If evidence of any darkened areas is still present, repeat the above three steps.

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Step #4 - Wash arc burn with water to dilute the enchant and to remove the residue of the enchant solution from the pipe surface.

Step #5 - Check arc burn area with a thickness gauge to see if the remaining wall thickness of the pipe meets the API requirements for which the pipe was manufactured and also meets the design criteria for which the pipe is being used.

If a repair is made by grinding, the arc burn must be completely removed and the remaining wall thickness must be at least equal to either:

- A. The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured; or
- B. The nominal wall thickness required for the design pressure of the pipeline.

Step #6 - Arc burn shall be cut out as a cylinder if the criteria in Step #5 is not met

Step #7 - Keep records on the location (Station Number) and amount of pipe wall removed, also X-ray number of welds.

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MUELLER® 520 AND 530 SERIES FULL-SEAL® STAINLESS STEEL PIPE REPAIR CLAMPS



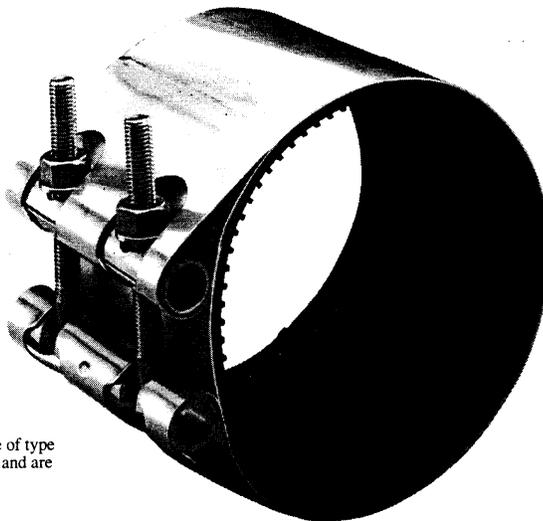
Grinnell® 11-9

Mueller 520 and 530 series Full-Seal Pipe Repair Clamps provide economical repairs and resist corrosion

MUELLER Full-Seal Pipe Repair Clamps provide an economical repair for circumferential breaks or cracks, multiple leaks or holes in pipe. They are available in 5", 6", 7-1/2", 9", 10", 12", 15", and 18" lengths for cast iron, ductile iron, and standard steel pipe. Each clamp size can accommodate a wide range of O.D. variations.

Lightweight all stainless steel clamps resist corrosive atmospheres and hot soils. Available in single-section Full-Seal® style (Series 520), in two-section Xtra-Range® style (Series 530), and in Servi-Seal® style with welded-in service outlet. Servi-Seal style is available in either single-section (Series 521-529) or two-section (Series 531-539).

- HIGH STRENGTH STAINLESS STEEL BOLTS--- have spin-fit threads, treated with an anti-galling agent, for fast installation — plus special tee-heads so they drop into bolt bar slots easily yet do not turn during tightening.
- STAINLESS STEEL GAP BRIDGES--- cemented to the gasket where the band sections join, to provide the 360° clamping pressure.
- BANDS---are made of type 304L stainless steel and are machine-welded.
- UNIQUE LOW-PROFILE DESIGN--- of the bolting mechanism makes clamp easy to handle, easy to fit around pipe.
- TAPERED END GRIDDED GASKET--- is made of specially compounded rubber, has a gridded pattern for positive sealing and tapered ends to make installation quick and easy.
- STAINLESS STEEL BOLTING MECHANISM--- is pre-assembled. Unique weight-saving Mueller design features lug and bolt bars which rotate as the clamp is tightened. This avoids bolt bending or binding, keeps tightening force close to the pipe surface and allows more efficient transfer of tightening force on the bolts to clamping force on the pipe.
- MAXIMUM GAS WORKING PRESSURE---for properly installed clamps at 150° F. maximum working temperature: 2"-8" 100 psig, 10"-12" cast iron or ductile iron pipes 60 psig, 10"-12" steel pipes 100 psig.

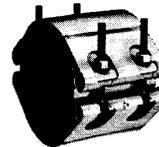


520 SERIES CLAMP

- Repair circumferential breaks, cracks
- Repair leaks and holes in pipe
- Repair longitudinal cracks
- Repair pulled services, broken pipe with Servi-Seal Clamp



SERVI-SEAL Clamp



530 Series Clamp

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STYLE 3137 FULL CIRCLE
STAINLESS STEEL REPAIR CLAMPS



Carton Quantity 10

CATALOG NUMBER	IPS PIPE SIZE	LENGTH	NO. OF BOLTS	BOLT SIZE	PRICE
3137-15-0204	1-1/4"	4"	2	1/2" X 2"	20.85
3137-15-0306	1-1/4"	6"	3	1/2" X 2"	40.60
3137-15-0408	1-1/4"	8"	4	1/2" X 2"	44.30
3137-16-0204	1-1/2"	4"	2	1/2" X 2"	28.25
3137-16-0306	1-1/2"	6"	3	1/2" X 2"	40.90
3137-16-0408	1-1/2"	8"	4	1/2" X 2"	43.35
3137-17-0204	2"	4"	2	1/2" X 2"	28.50
3137-17-0306	2"	6"	3	1/2" X 2"	40.75
3137-17-0408	2"	8"	4	1/2" X 2"	48.45
3137-18-0204	2-1/2"	4"	2	1/2" X 2"	26.75
3137-18-0306	2-1/2"	6"	3	1/2" X 2"	38.50
3137-18-0408	2-1/2"	8"	4	1/2" X 2"	53.50
3137-19-0204	3"	4"	2	5/8" X 2"	32.75
3137-19-0408	3"	8"	4	5/8" X 2"	58.50
3137-19-0612	3"	12"	6	5/8" X 2"	71.25
3137-21-0204	4"	4"	2	5/8" X 2"	30.30
3137-21-0408	4"	8"	4	5/8" X 2"	65.50
3137-21-0612	4"	12"	6	5/8" X 2"	90.35
3137-23-0204	5"	4"	2	5/8" X 2"	41.85
3137-23-0408	5"	8"	4	5/8" X 2"	63.95
3137-23-0612	5"	12"	6	5/8" X 2"	84.85
3137-24-0204	6"	4"	2	5/8" X 2"	47.00
3137-24-0408	6"	8"	4	5/8" X 2"	73.30
3137-24-0612	6"	12"	6	5/8" X 2"	124.10
3137-25-0308	8"	8"	3	3/4" X 3"	94.90
3137-25-0410	8"	10"	4	3/4" X 3"	111.70
3137-25-0512	8"	12"	5	3/4" X 3"	145.15
3137-27-0308	10"	8"	3	3/4" X 3"	105.40
3137-27-0410	10"	10"	4	3/4" X 3"	125.70
3137-27-0512	10"	12"	5	3/4" X 3"	144.00
3137-28-0308	12"	8"	3	3/4" X 3"	117.35
3137-28-0410	12"	10"	4	3/4" X 3"	127.80
3137-28-0512	12"	12"	5	3/4" X 3"	184.00

ITEM: STAINLESS STEEL REPAIR CLAMPS, Style 3137

STOCK NO.	PART NUMBER	DESCRIPTION	APPROVED MANUFACTURER
13010	3137-16-0306	1 1/2 x 6	Continental
13030	3137-17-0306	2 x 6	Continental
13050	3137-21-0408	4 x 8	Continental
13070	3137-24-0408	6 x 8	Continental

DATE: 3/4/96

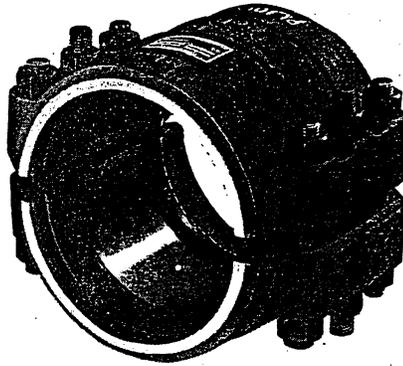
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PLIDCO® SPLIT+SLEEVE

Plidco Split+Sleeves are used for making permanent repairs to a variety of pipelines while the line continues on stream.



ITEM: Split Sleeve with Buna N Packing

STOCK NO.	PART NUMBER	DESCRIPTION	APPROVED MANUFACTURER
13130	SSO-060018	6"x18", 1000 wp, 12 sa, dr 769	Plidco

DATE: 3/4/96

APPROVED BY: SW