



Description	This procedure is used to repair or remove welds that are found unacceptable under 49 CFR 192.241(c).
Regulatory Applicability	All welds that are found to be unacceptable under 49 CFR 192.241(c) <input checked="" type="checkbox"/> Regulated Transmission Pipelines <input checked="" type="checkbox"/> Regulated Gathering Pipelines (Type A) <input checked="" type="checkbox"/> Regulated Gathering Pipelines (Type B) ¹ <input checked="" type="checkbox"/> Regulated Distribution Pipelines
Frequency	As needed
Reference	49 CFR 192.245 <i>Repair or Removal of Defects</i> LA Title 43 Part XIII 1325 <i>Repair or Removal of Defects</i>
Forms / Record Retention	F-192.225 <i>Pipeline Welding Packet / Life of Pipeline System</i>
Related Specifications	API 1104 <i>Welding of Pipelines and Related Facilities</i> ASME Boiler Pressure Vessel Code (Section 9)
OQ Covered Task	0801 <i>Welding</i> (In order to perform the tasks listed above; personnel must be qualified in accordance with West Texas Gas's Operator Qualification program or directly supervised by a qualified individual.)

¹ If the line is new, replaced, relocated or changed.



Procedure Steps

Repair or Removal Requirements

1. With the exception of welds on offshore pipelines being installed from a pipeline vessel, each weld having a crack of more than 8% of its length must be removed.
2. Each weld that is repaired must have the defect removed down to sound metal and the segment to be repaired must be preheated if conditions exist that would adversely affect the quality of the weld repair.
3. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability.
4. All repairs must be performed in accordance with written weld procedures that have been qualified under 49 CFR 192.225 (See procedure P-192.225.). Repair procedures must ensure that the minimum mechanical properties specified for the welding process used to make the original weld are met upon completion of the final weld repair.

NOTE: The procedures on the following pages should be used as guidelines, but the actual welding on the repairs / removals must be performed using qualified welding procedures according to procedure P-192.241.

Repair of Weld Defects Other than Cracks

1. Does the pressure in the pipeline provide a safe working condition at the location of the repair?
 - a) If yes, go to Step 2.
 - b) If no, reduce the pressure according to company guidelines before proceeding to Step 2.
2. Locate and mark the defect area to be repaired.
3. Will the repair of the defect require grinding the weld below the pipe surface?
 - a) If yes, go to Step 4 or 5 as appropriate.
 - b) If no, go to the section Repair Defects of a Cover Pass on a Weld Other than a Crack.
4. For butt welds:
 - a) Grind the cover pass(es) flush with the pipe surface and continue to grind a groove down through the weld metal until the defect is completely removed or until the remaining weld thickness is thin enough that a new bead will penetrate the defect area with sound weld metal.
 - b) Proceed to Step 6.
5. For fillet welds:
 - a) Grind as necessary to repair the weld, taking caution not to grind into the carrier pipe.
 - b) Reweld the ground-off area using a qualified procedure. The repair area should be uniform, blending with the adjacent weld metal in order to minimize stress concentrators.
 - c) Proceed to Step 6.



6. Prior to welding, preheat to a minimum of 200°F for a distance of approximately 3 inches on each side of the weld. The preheat temperature should be maintained during welding.
7. Weld the grooved area using a qualified welding procedure. The repair area should extend 1.5 to 2 inches past both ends of the defect area.
8. Inspect the repaired area using the same means used to detect the defect.
9. Does the repaired area meet the requirements of the inspection?
 - a) If yes, go to Step 10.
 - b) If no, refer to the appropriate section of the procedure Repair of a Previously Repaired Area or Replacement of a Weld or Cylinder of Pipe to cut out and replace the weld.
10. Document the repair. File the repair documentation according to company policy.

Repair Defects of a Cover Pass on a Weld Other than a Crack

1. Does the pressure in the pipeline provide a safe working condition at the location of the repair?
 - a) If yes, go to Step 2.
 - b) If no, reduce the pressure according to company guidelines before proceeding to Step 2.
2. Locate and mark the defect area to be repaired.
3. Will the repair require grinding (such as when repairing external undercut or pinholes)?
 - a) If yes, go to Step 4
 - b) If no, repair the defect (such as low or narrow cap) by recapping the weld in the defect area. Then go to Step 7.

NOTE: Preheat may be required if the weld has cooled.

4. Will the repair of the defect require grinding the weld below the pipe surface?
 - a) If yes, refer to the section Repair of Weld Defects other than Cracks.
 - b) If no, go to Step 5.
5. Grind the cover pass(es) flush with the pipe surface. (For fillet welds, grind as necessary as you repair the weld, taking caution not to grind into the carrier pipe).
6. Reweld the ground-off area. The repair area should be uniform, blending with the adjacent weld metal in order to minimize stress concentrators.

NOTE: Preheat may be required if the weld has cooled.

7. 7) Inspect the repaired area, using the same means used to detect the defect.
8. 8) Does the repaired area meet the requirements for inspection?
 - a) If yes, go to Step 9.
 - b) If no, refer to either the section of this procedure titled Repair of a Previously Repaired Area or go to the section Replacement if a Weld or Cylinder of Pipe to cut out and replace the weld.



9. Document the repair.
10. File the repair documentation according to company policy.

Repair or Removal of Butt Welds Containing Cracks

1. Does the pressure in the pipeline provide a safe working condition at the location of the repair?
 - a) If yes, go to Step 2.
 - b) If no, reduce the pressure before proceeding to Step 2
2. Locate and mark the defect area to be repaired. Is the crack less than 8% of the weld length?
 - a) If yes, go to Step 3.
 - b) If no, the entire weld must be cut out and replaced. Go to the procedure Replacement of a Weld or Cylinder of Pipe.
3. Grind the cover pass(es) flush with the pipe surface. Continue to grind a groove down through the weld metal until the crack is completely exposed and until the remaining weld thickness is thin enough that a new bead will penetrate the crack area with sound weld metal. Use magnetic particle or dye penetrant inspection to determine the exact position and pattern of the crack in the ground area.
4. Once satisfied that the entire crack has been exposed, preheat the repair area to a minimum temperature of 200°F for a distance of at least 3 inches each side of the ground-out area and at least 3 inches beyond each end of the ground-out area circumferentially. This temperature should be maintained throughout welding.

NOTE: A qualified crack repair procedure must be followed in Steps 5 through 9.

5. Weld a new root bead, obtaining full penetration through the crack area. Grind the root pass and weld a second pass in the same area to ensure that all evidence of the crack has been completely removed.
6. Grind the second pass smooth and perform magnetic particle or dye penetrant inspection again to locate any traces of a crack.
7. Are there any traces of a crack remaining?
 - a) If yes, repeat Steps 4 through 6.
 - b) If no, go to Step 8.
8. Check the preheat temperature and reheat if necessary. Weld the remaining passes and grind smooth.
9. Once the weld is completed and allowed to cool to ambient temperature, re-inspect the repaired area using the same means used to detect the defect.
10. Does the repaired area meet the requirements of the inspection?
 - a) If yes, go to Step 11.



- b) If no, refer to either the sub-task Repair of a Previously Repaired Area or go to sub-task Replacement of a Weld or Cylinder of Pipe to cut out and replace the weld.

11. Document the repair.
12. File the repair documentation according to company policy.

Replacement of a Weld or Cylinder of Pipe

1. Purge the isolated section of the line with air or nitrogen as appropriate.
2. Ensure that the pipe is adequately exposed according to company guidelines.
3. Obtain an adequate length of pretested pipe.
4. Excavate the line as appropriate for the product in the line according to company guidelines.
5. Turn off the closest upstream and downstream rectifiers.
6. Install jumper cable, attaching the jumper cable ends at points beyond the locations of final cuts.
7. Make rough cuts to remove section of pipe.
8. Remove the section of pipe.
9. Seal off the inside or each pipe end by use of expandable plugs, gas bags, or other sealing devices.
10. Ensure that the open ends are free of an explosive mixture. (Use a detection device appropriate to the welding procedures used).
11. Bevel and prepare pipe ends for welding according to the welding procedure to be used.
12. Remove the sealing devices used in Step 9.
13. Set the replacement pipe section in place and align pipe ends for welding by use of external lineup clamps.
14. Weld the replacement section of pipe into the adjacent pipe according to a qualified butt weld procedure appropriate for the pipe being welded.
15. Remove the jumper cable.
16. Inspect each weld by radiography in accordance with API Standard 1104.
17. Is the weld acceptable?
 - a) If yes, go to Step 18.
 - b) If no, repair the weld according to a qualified procedure. Repeat Step 16.
18. If used, remove the stoppling devices according to the stoppling procedure.
19. Install sandbag supports under each stopple fitting.
20. Apply proper coating to the welded areas and replacement section as necessary.
21. Turn on rectifiers that were turned off in Step 4.



22. If applicable, restore pressure to the isolated section of the line.
23. Notify appropriate operations personnel that the pipeline has been successfully repaired and is ready for service.
24. Document the repair.
25. File the repair documentation according to company policy.

Repair or Removal of Arc Burns

1. Does the pressure in the pipeline provide a safe working condition at the location of the repair?
 - a) If yes, go to Step 2
 - b) If no, reduce the pressure according to company guidelines before proceeding to Step 2.
2. Grind, file, and/or sand the arc burn area, blending it in with the contour of the pipe until visual evidence of the arc burn area is completely removed. (If grinding, check for pipe defects that affect the wall thickness in the area to be repaired before grinding.)
3. Etch the arc burn area with a 10–20% (by volume) solution of ammonium persulfate or 2% (by volume) solution of nital. (Note: The solution should be prepared by a person knowledgeable in the methods and hazards associated with mixing etching solutions.)
4. Visually inspect the arc burn area for consistent coloring. Is the area consistent in color?
 - a) If yes, go to Step 5.
 - b) If no, repeat Steps 2 through 4.
5. Rinse the arc burn area with water to dilute the etching solution and remove any residue from the pipe surface.
6. Use ultrasonic readings to determine the remaining pipe wall thickness in the area of the repair:
 - a) The minimum thickness required by the tolerances in the specification to which the pipe is manufactured (refer to API Specification 5L).
 - b) The minimum wall thickness for the design pressure of the pipeline (refer to 192.105(a)).
7. Does the remaining wall thickness of the repaired area meet the requirements?
 - a) If yes, go to Step 8.
 - b) If no, the entire arc burn area must be cut out as a cylinder. See “Replacement of a Weld or Cylinder of Pipe.”
8. Document the repair. File the repair documentation according to company policy.

Repair of a Previously Repaired Area

1. Does the pressure in the pipeline provide a safe working condition at the location of the repair?
 - a) If yes, go to Step 2.



- b) If no, reduce the pressure before proceeding to Step 2.
2. Locate and mark the defect area to be repaired.
3. Grind the cover pass(es) flush with the pipe surface. Continue to grind a groove down through the weld metal until the defect is completely removed and until the remaining weld thickness is thin enough that a new bead will penetrate the defect area with sound weld metal.
4. Preheat the repair area to a minimum temperature of 200°F for a distance of at least 3 inches each side of the ground-out area and at least 3 inches beyond each end of the ground-out area circumferentially. This temperature should be maintained throughout welding.
5. Weld the grooved area using a qualified welding procedure for a previously repaired area. The repair area should extend 1.5 to 2 inches past both ends of the defect area.
6. Once the weld is completed and allowed to cool to ambient temperature, re-inspect the repaired area using the same means used to detect the defect.
7. Does the repaired area meet the requirements of the inspection?
 - a) If yes, go to Step 8.
 - b) If no, repeat Steps 2 through 6 to repair this previously repaired area, or go to the section on Replacement of a Weld or Cylinder of Pipe to cut out and replace the weld.
8. Document the repair.
9. File the repair documentation according to company policy.



THIS PAGE INTENTIONALLY LEFT BLANK.