

General Repair Information

Regardless of all the precautions taken in the original cure and maintenance of rubber lined equipment, some rubber linings will eventually need repairs. When repairs are necessary, they can vary from small blisters or cracks to major areas in numerous panels of rubber.

The methods of repair are generally dictated by the type of the original lining, extent of repair, intended service and the facilities available. For these reasons there are no standard methods of repair especially when considering field repairs. The only repairs that can be presumed to be equal to the original lining are those that are made with the same stock used in the original lining and given a full re-cure of the repair. On occasions it is not possible to re-cure the vessel in the original manner, other alternate methods have to be used.

In this repair section there are step-by-step procedures for different repairs, but there may be occasions where slight deviations have to be made. In general the following standards have to be met regardless of the type of repairs that are made.

- The damaged metal and rubber must be properly prepared by buffing or grinding. The surface of the rubber adjacent to the repair area should be buffed to clean rubber back for a minimum of 4 inches.
- Before cementing, the entire work area must be clean. All buffing dust, grindings, moisture and acid fumes, etc. should be removed not only from the direct area, but also from any adjacent area where it might be carried or blown in.
- The cements must be applied in the proper sequence on the metal and/or buffed rubber and allowed to dry between each coat.
- The mating surfaces shall have a minimum of 30° skive and must be of correct size for fill-in and/or overlap.
- The mating surfaces of the repair stocks must be swabbed with toluene or cement, and allowed to dry.
- The repair compounds must be carefully rolled and stitched down and all trapped air removed.

1. Repair for Surface Defects of the Rubber Lining

When a flaw in the rubber lining does not have to be cut out, such as a thin area or surface damage to the lining, a patch is sufficient if agreed upon between the applicator and owner. The patch can be as small as 2" (5 cm) or large enough to cover several flaws. See Fig.11-1 for details.

- 1.1 Use rubber stocks, primers and cements indicated on Technical Data Sheet for repair.
- 1.2 Remove all loose or defective rubber, cutting back to areas of good adhesion.
- 1.3 Buff or roughen rubber to be lined.
- 1.4 Refresh the buffed rubber surface with clean solvent.
- 1.5 Cement the buffed rubber surfaces. This may require more than one coat.
- 1.6 Apply cements to a patch of uncured rubber stock. This patch should be cut with skived edges and be large enough to fit the buffed and cemented of the original lining.
- 1.7 Roll down the patch carefully and remove any trapped air.
- 1.8 Cure the patch in the same manner as originally cured. In the case of large vessels that were cured originally with atmospheric steam, a single repair may be cured by building a box around the patch, or otherwise confining the steam to the area of the patch.

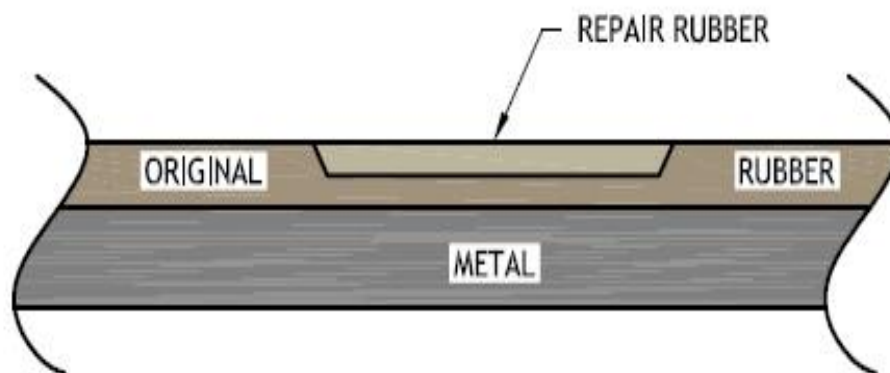


Fig. 11-1 Repair for surface defects of rubber lining

2. Cover Patch + Fill-in (Inlay) Repair of the Rubber Lining

- 2.1 Use rubber stocks, primers and cements indicated on Technical Data Sheet for repair. See Fig. 11-2 for details.
- 2.2 Remove the defective rubber to good adhesion to metal. In the case of a pinhole leak, this operation is omitted.
- 2.3 Buff or grind exposed metal until clean and bright. If metal damage has occurred the rubber must be removed back to good adhesion or 8" beyond damaged metal. Repair metal. During metal cutting and welding, the metal between the weld and original rubber must be kept cool so as not to overheat rubber or the bond. After the welding is complete the weld spatter must be removed and the weld ground smooth.
- 2.4 Buff edges of exposed rubber to a minimum of 30° bevel.
- 2.5 Buff surface of original lining back 4" from cut edge. The rubber surface must be free from dust, moisture and acid fumes. Moisture will reduce and often destroy adhesion of the cement, making a successful repair impossible. Any traces of contamination on the rubber being repaired should be neutralized.
- 2.6 Cement the metal using the following steps:
 - One coat of primer
 - One coat of intermediate
 - Two coats of tack
- 2.7 Cement the buffed rubber with two coats of tack.
- 2.8 Use pattern and cut a piece of the original uncured lining to conform with the edges that have been skived to a 30° bevel. Cement the surface of the rubber patch with tack and allow it to dry.
- 2.9 Inlay the uncured lining stock over the metal and skive onto the beveled edges of the buffed rubber. This is usually done by using a slightly larger piece of stock than necessary and trimming flush with original lining after thoroughly rolling into place.
- 2.10 Apply a cover patch of uncured lining over the inlay. This cover patch should be cut with skived edges and be large enough to fit the buffed and cemented surface of the original lining.
- 2.11 Roll the stock in a straight line working from center to edges allowing the air to escape ahead of the roller.
- 2.12 Cure entire unit in the same manner as originally cured. In the case of large vessels that were cured originally with atmospheric steam, a single repair may be cured by building a box around the patch, or otherwise confining the steam to the area of the patch.

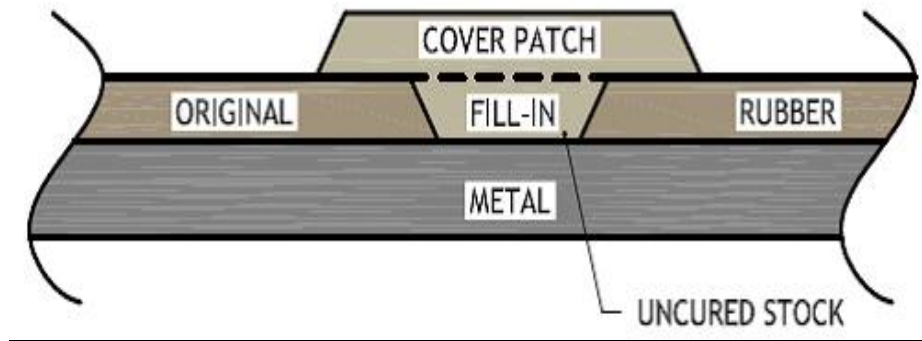


Fig. 11-2 Cover patch with fill-in (inlay) repair

3. Repairs for Large Areas of the Rubber Lining

It is permissible to use a single thickness of uncured stock over the area to be repaired. The patch should extend out 4" onto the old rubber. See Fig. 11-3 for details.

It is permissible to use single thickness of chemical cure stock over area to be repaired. This patch should extend out 4" on old rubber. Use the same cement and activator procedures as outlined in the chemical cure section.

- Use rubber stock, primer and cements indicated on Technical Data Sheet for repair.
- Use same repair procedure per Section 2 "Cover + Fill-in Repair".
- Cure per recommendations from Technical Data Sheet.

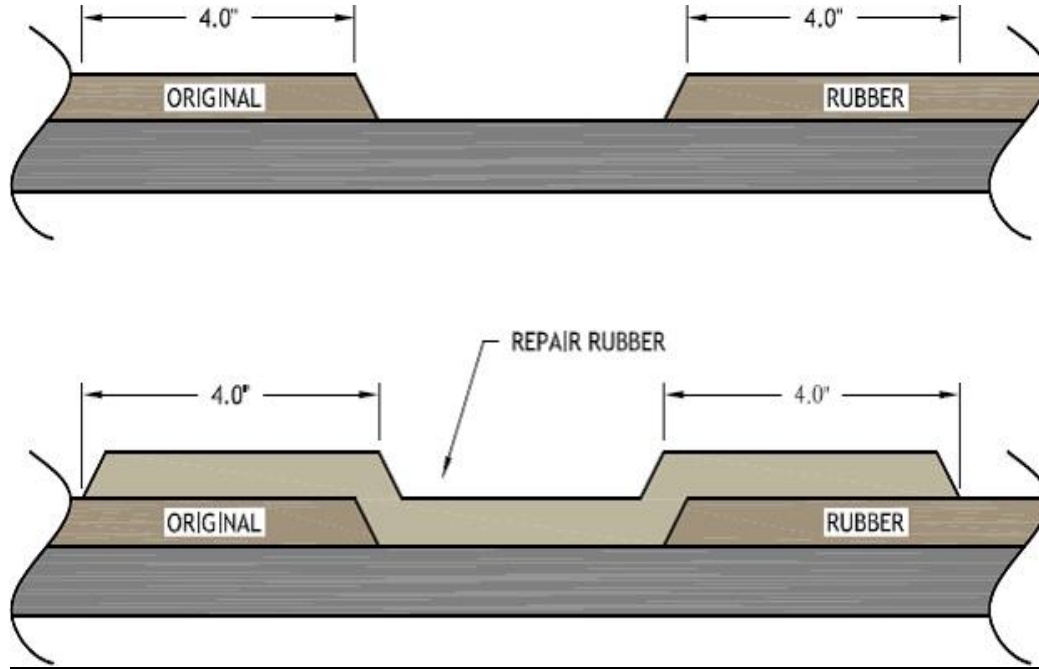


Fig. 11-3 Large area repair

4. Repair for Hard, Semi Hard and Triflex™ Rubber Lining

- 4.1 Use rubber stock, primers and cements indicated on Technical Data Sheet for repair.
- 4.2 Remove the defective rubber to good adhesion.
- 4.3 Buff or grind exposed metal until clean and bright.
- 4.4 Buff surface or original lining back 4" from cut edge. The rubber must be free from dust, moisture and acid fumes.
- 4.5 Cement metal and buffed rubber as follows:
 - One coat of primer
 - One coat of intermediate
 - Two coats of tack
- 4.6 Inlay uncured rubber over the metal and skive onto a minimum of 30° beveled edges of the buffed rubber. This is usually done by using a slightly larger piece of stock and trimming flush with original lining after it is rolled and stitched into place.

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- 4.7 Apply cement to the top surface of the inlay patch with tack.
- 4.8 Apply a cover patch (1/8" thick) of uncured rubber on to the top of the inlay rubber.
- 4.9 Cement the mating surfaces of the patch material with tack. The cover patch should be cut large enough to extend out 4" on the buffed and cemented area of original lining.
- 4.10 Thoroughly roll and stitch repair stocks to original lining.
- 4.11 Cure repair with atmospheric steam.

5. Chemical Cure Repair

- 5.1 Remove the defective rubber to good adhesion.
- 5.2 Buff or grind exposed metal until clean and bright.
- 5.3 Buff surface of original lining back 4" from cut edge. The rubber must be free from dust, moisture and acid fumes. Moisture will materially reduce and often destroy adhesion of the cement, making a successful repair impossible.
- 5.4 Cement the metal as follows:
 - One coat of primer
 - One coat of intermediate
 - Two coats of tack
- 5.5 Cement the buffed rubber with two coats of tack. Allow each coat of cement to dry thoroughly. In small repairs where the rubber is cut or gouged, but not loose from the metal, the buffed out areas should have two coats of tack.
- 5.6 Cut a piece of chemical cure repair rubber to conform to the edges skived to a 30° bevel. Cement the surface of the rubber with tack and allow it to dry.
- 5.7 Inlay the chemical cure repair material over the metal and skive onto the beveled edges of the buffed rubber. This is usually done by using a slightly larger piece of stock than necessary and trimming flush with original lining after thoroughly rolling into place.
- 5.8 After the inlay is in place the top surface should receive an additional coat of tack.
- 5.9 Apply a cover patch of chemical cure rubber over the inlay. The cover patch should be cut large enough to fit the buffed and cemented surface on the original lining.

- 5.10 Brush the entire exposed surface of the cover patch with three separate coats of C-700 or C-600 activator. Dry 30 minutes between coats. Take care that activator C-700 or C-600 does not run off the surface. If repair is on a vertical surface or overhead, apply at least one coat of C-700 or C-600 to surface of repair stock before it is positioned. After completion of the final coat of C-700 or C-600, there should be a time lapse of at least 8 hours before repair is put into service.

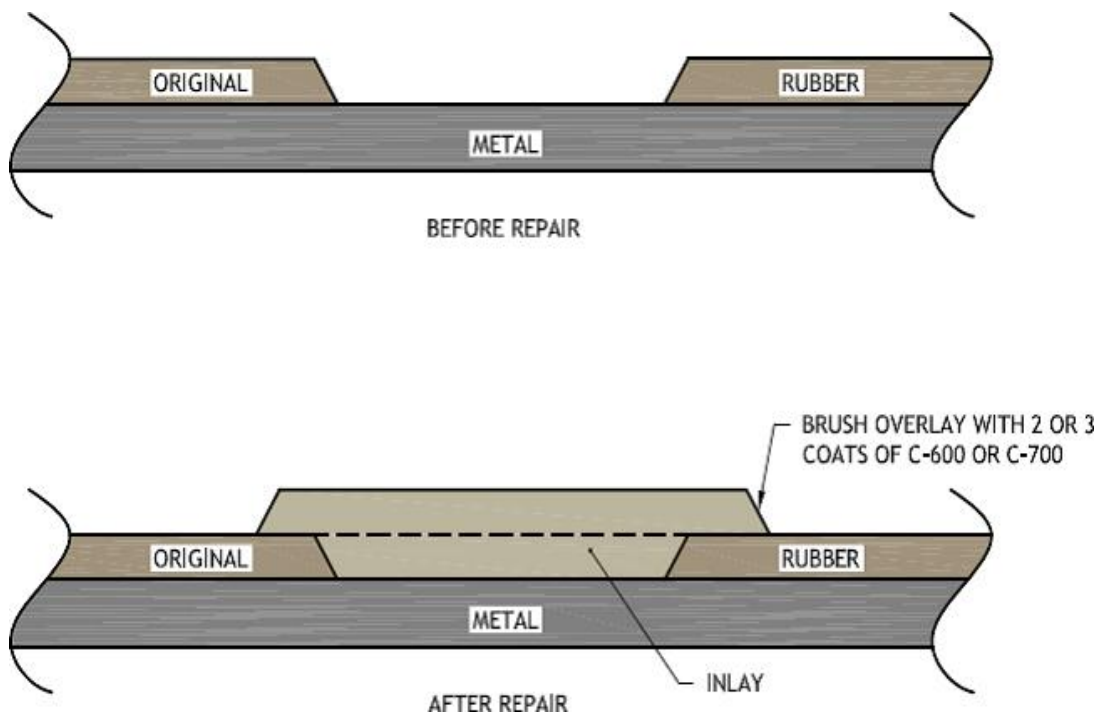


Fig. 11-4 Chemical cure repair

For assistance of repairs, please contact your Polycorp representative.