CRANE Composites

Transportation Liner Repair Procedure

For use with Repair Kit #R50RK85, #R50RK85TUF, #R50RK85TUF-INTL

Please Read All Instructions Before Beginning

These guidelines are provided in good faith, but without guarantee. The manufacturer and/or distributor of the product bear no responsibility for actions taken or not taken. There are many nuances of repair techniques that are assumed to be general knowledge; such nuances are not included in these instructions. Rather, these guidelines are strictly recommendations and are not intended to serve as a step-by-step, foolproof repair checklist. Selection of an experienced repair facility is the sole responsibility of the owner.

Since conditions of use are beyond Crane Composites' control, all risks are assumed by the user. Nothing herein shall be construed as a recommendation for uses which infringe on valid patents or as extending a license under valid patents.

If you have any questions about repair techniques for your particular project, please call 1.800.435.0080 or 1.815.467.8600 and ask for Customer Care or e-mail sales@cranecomposites.com.

CAUTION: Wearing disposable latex gloves, goggles, and use of an OSHA approved respirator are recommended. Read and follow all manufacturer safety recommendations on labels of materials used for repair. Some materials may be flammable and should be used with caution.

Please review MSDS Form # 7096 at www.cranecomposites.com before beginning repair.

Safety Precautions

1. Protect your eyes with goggles, cover your nose and mouth with OSHA-approved respirator, and wear gloves when cutting and sanding fiberglass and using polyester resin, epoxy, and acetones.

2. Resins and solvents are highly flammable. Do not smoke or use electric tools that cause sparks. Always read the caution labels on all solvent containers and take the necessary precautions.

3. Make sure the work area is well-ventilated.

Assess Damage

Evaluate the severity of the damage to select the appropriate repair method.

- **Method 1:** Small Tear, Puncture, or Hole
- **Method 2:** Large Tear or Hole

NOTE: Due to the unique finish of Crane Composites panels, an exact match is impossible to achieve with a repair.

Supplies and Equipment

Contents of Kemlite Liner Repair Kit (R50RK85)

For all liners except ArmorTuf®

- Glass Mat (R13508): 1 pc, 3′ x 4′
- 1 qt. Polyester Resin Mix
- Embossed Film (R06503): 1 pc, 3′ x 4′
- Smooth Film (R04506): 1 pc, 3′ x 4′
- Hardener (catalyst): 2 Tubes, 15cc each
- 2 Spreaders
- 1 Pair Gloves
- 2 Mixing Cups (500cc graduated)
- 4 Mixing Sticks
- Instruction Manual: 1
- MSDS Form #7096 for Resin
- MSDS for Bondo Hardener

Contents of ArmorTuf (EARM or ARMT) Repair Kit Repair Kit (R50RK85TUF or R50RK85TUF-INTL)

- 1 Piece WR Fabric 2′ x 2′ (R77037) 18 oz.
  (Includes contents listed above except for glass mat)

For Most Repairs, You'll Also Need

- Acetone for Clean Up (caution: acetone is extremely flammable)
- Rags (White)
- Masking Tape 1″ or 2″ wide
- White Spray Paint (acrylic or urethane)

Tools That Are Useful

- Utility Knife
- Sander with Medium Grit Paper
- Wire Brush
- Stiff Bristle Brush
- Putty Knife
- Scissors
- Jigsaw or Router
- Drill

Method 1: For Small Tears, Punctures, and Holes

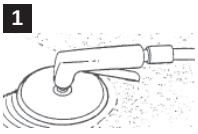
The Wet Lay-Up Repair Process

The wet lay-up repair using Crane Composites' liner repair kit has proven to be the best universal method for repairing rips, tears, and gouges that have broken through the surface of the fiberglass liner panel.

Use this method to repair damage up to 2′ in length where the liner material is intact and not missing. If material is missing, you will want to consider method 2.

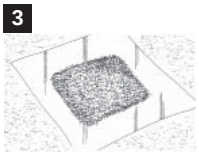
The success of a wet lay-up repair depends on proper preparation of the fiberglass surface. The surface must be abraded to give it a tooth for good adhesion between the resin mix and the liner panel, and it must be dry and totally free of grease, dust, and dirt.

1. Sand damaged area; extend sanding 2″ beyond the damage in every direction.



2. Clean damaged area with acetone or a similar solvent.

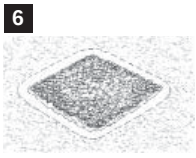
3. Cut the glass mat slightly smaller than the sanded area (about a 1/4″ to 1/2″ less on every side). Place the glass mat on smooth film (the smooth film is just a clean working area). Next, cut a piece of the embossed film at least 2″ larger than the sanded area (on each side). If the sanded area is 6″ x 6″, then the film should be at least 10″ x 10″.



4. Measure out the repair mix into a plastic beaker (100cc is enough for an 8″ x 8″ repair). Add 1% - 2% of the Bondo hardener to the repair mix (1% = 1cc or 20 drops per 100cc of mix). Mix the hardener into the mix for at least 45 seconds. The repair mix will gel (become extremely thick, but not hard) in about 15-20 minutes with 2% hardener and about 25-40 minutes with 1% hardener.

5. Spread a layer of mix (about 1/8″ thick) over the sanded area using the yellow plastic squeegee. Leave about 1/2″ to 1″ space between the mix and the edge of the sanded area.

6. Place the glass mat in the center of the sanded area. Use the squeegee to wetout the glass with the mix and smooth out any wrinkles in the glass mat. Add mix to the topside of the glass if needed.



7. Spread a thin layer of additional mix on top of the glass mat or on the embossed film. Be sure glass is thoroughly wetout (no dry areas). This is very important at the edges of the repair.

7

8. Place the embossed film over the glass mat. Center as much as possible. Also, try to match the alignment of the embossed film with the embossment of the panel. Using a soft rag, lightly work the mix out to the edges of the sanded area. Use light pressure or the embossed peaks will be crushed.

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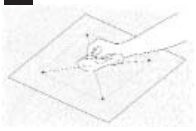

Note: When the repair is completed, but before it has cured, wipe off excess mix that went beyond the sanded area (use a white rag and some acetone). A full cure should be achieved in 1-2 hours. Apply moderate heat using a heat gun or heat lamp to speed up the cure time. Afterwards, trim off excess film on the edges with a knife.

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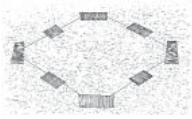

9. If the embossed film is lifting up at the edges, tape down the edges with masking tape. If repairing the ceiling, the film should be taped down to prevent possible sagging.

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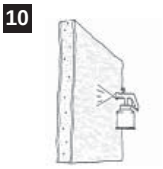


10. After the repair has cured, the color may be slightly different than the panel. A white acrylic enamel or urethane paint can be used to blend the repair into the liner panel.

Method 2: For Large Tears and Holes

The Panel In-Lay Repair Process

The panel-in lay repair using Crane Composites' liner repair kit has proven to be the best repair method for repairing large tears and holes that have removed part of the surface of the fiberglass liner panel.

Use this method to repair damage where the liner material is not intact or missing. If material is not missing you will want to consider method 1.

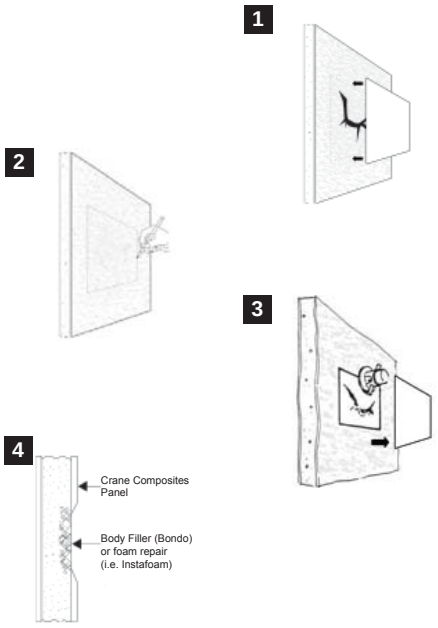
The success of a panel-in-lay repair depends on proper preparation of the fiberglass surface. The cut out must be neat and straight, and both the replacement section and damaged liner surfaces must be clean. Some of the steps (options) require surface abrading.

1. Cut a section of the replacement liner panel that is at least 2″ larger than the damaged area on all sides.

2. Center the replacement liner panel over the damaged area. While holding securely, trace around the perimeter of the replacement panel.

3. Cut out the section within the traced lines using a jigsaw, router, or electric shears.

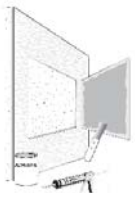
4. Repair any foam damage using foam repair material (such as Insta-Foam™) or body filler (such as Bondo®). Bring the repaired foam area level with the bottom of the original liner panel.



5. **There are two approaches for this step:**

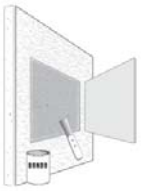
Option A:
Allow the foam repair to cure, then sand if necessary. Bond the replacement liner section into the cut out section using a urethane adhesive (such as Sikaflex®). Brace the replacement panel until the adhesive has cured. Clean off any excess adhesive that squeezes out around the seams.

5A



Option B:
The replacement liner panel should achieve a good bond to polyester or epoxy based body fillers and to urethane foam repair materials. After filling the foam cavity with repair foam or body filler, (but before they cure) put the replacement liner section in place. A slight excess of foam or body filler may be required to assure good contact with the back of the replacement liner section. Clean off any excess foam or body filler that squeezes out around the seams. Brace the replacement panel until the foam or body filler has cured.

5B



6. **Seam Treatments | There are Three Approaches:**

Option A:
For smaller, non-structural repairs, fill the seams with a white, silicone caulk or catalyzed repair mix.

6A

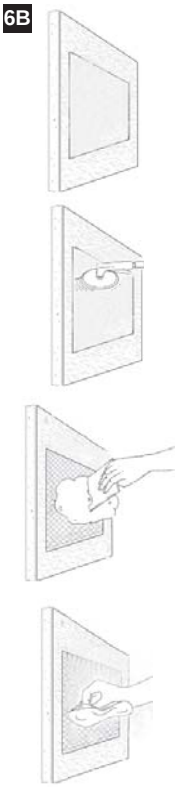
Option B: For Medium Areas (6″ x 6″ - 18″ x 18″)

1. For smaller, structural repairs (or areas that will get abused) sand over the seams and the entire patch area; go at least 1″ - 2″ beyond the seams on the undamaged side of the panel. Then, do a wet lay-up repair using repair mix and glass mat over the entire patch. See Repair Method 1 for more in depth information on the wet lay-up process.

2. Sand entire patch.

3. Apply wet lay-up repair to entire patch area using glass mat and catalyzed repair mix. Cover with film and smooth repaired patch area with a soft rag.

6B



Option C: For Very large Areas (Greater than 18″ x 18″)

1. For larger, structural repairs (or areas that will get abused) sand over the seams about 2″ - 4″ on each side of the seam. Then do a wet lay-up repair using repair mix and glass mat over the seams. See Repair Method 1 for more in depth information on the wet lay-up process.

2. Sand seams and apply wet lay-up repair to seams using glass mat and catalyzed repair mix.

   Cover with film and smooth repaired seam areas with soft rag.

6C

7. After the repair has been completed, there may be a color difference between the original liner and the replacement liner section. A white acrylic enamel or urethane spray paint can be used to blend the two areas together.

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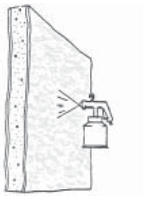

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Crane Composites is the manufacturer of ArmorTuf, Kemlite and a variety of other fiberglass reinforced plastic (frp) composite panels. Inspired by the Kemlite tradition, Crane Composites has over 55 years of experience in Transportation Products and is a recognized industry leader in frp applications.

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