TO: ALL HOLDERS OF REPAIR OF MISCELLANEOUS AIRPLANE-INTERIOR COMPONENTS
COMPONENT MAINTENANCE MANUAL 25-00-66

REVISION NO. 10 DATED MAR 01/03

HIGHLIGHTS

The data in this manual supersedes the data contained in 25-00-64 and 25-00-65.

Pages which have been added or revised are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed and enter Revision No. and date on the Record of Revision Sheet.

| CHAPTER/SECTION AND PAGE NO. | DESCRIPTION OF CHANGE |
|---|---|
| REPAIR-GEN<br>602-603<br>REPAIR 8-1<br>601 | Added potting compound BMS 5-28, Type 19 to REPAIR-GENERAL and REPAIR 8-1 as an alternative material to BMS 5-28, Type 18. |

# REPAIR OF MISCELLANEOUS AIRPLANE - INTERIOR COMPONENTS

## NO ASSIGNED PART NUMBER

COMPONENT MAINTENANCE MANUAL

REVISION RECORD

- Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision number, date inserted and initial.

| REVISION NUMBER | REVISION DATE | DATE FILED | BY | REVISION NUMBER | REVISION DATE | DATE FILED | BY |
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## TEMPORARY REVISION AND SERVICE BULLETIN RECORD

| BOEING SERVICE BULLETIN | BOEING TEMPORARY REVISION | OTHER DIRECTIVE | DATE OF INCORPORATION INTO MANUAL |
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TABLE OF CONTENTS

# REPAIR OF MISCELLANEOUS AIRPLANE-INTERIOR COMPONENTS

## DESCRIPTION AND OPERATION

1. This manual gives procedures for repair of the surfaces of certain airplane-interior components. These procedures are to help you make sure the repaired parts will continue to agree with the fireworthiness rules for airplane interiors. The rules give the persons in the airplane more protection from the sudden flames that come when materials become heated to their flash point temperature.

# CHECK

1. General

   A. This procedure contains the data necessary to find defects in the material of different parts.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

2. Check

   A. References

      (1) Nondestructive Test Manual, Part 1, 51-01-01

      (2) Nondestructive Test Manual, Part 2, 51-00-01

      (3) Nondestructive Test Manual, Part 9, 51-00-01

      (4) SOPM 20-20-01, Magnetic Particle Inspection

      (5) SOPM 20-20-02, Penetrant Methods of Inspection

   B. Procedure

      (1) Use standard industry procedures to do a visual check of all visible parts for cracks, defects or damage. It is necessary to do more checks on the parts that you think are damaged.

      (2) Refer to the applicable Component Maintenance Manual to identify if the parts can be examined with magnetic particles as specified in SOPM 20-20-01 or with liquid penetrant as specified in SOPM 20-20-02.

      (3) If applicable, do a check of all the composite structure:

         (a) Do a check of the honeycomb and the bonded parts for internal water, scratches, and contour damage. Do a check of the bonded parts for delaminations.

            1) If you see delaminations or contour damage, do an ultrasonic check or a tap test to find all of the damage.

               NOTE: Refer to Part 1, 51-01-01 of the applicable Nondestructive Test Manual as a guide.

            2) Examine areas that you think contain water radiographically as specified in Part 2, 51-00-01, or by thermography as specified in Part 9, 51-00-01, of the applicable Nondestructive Test Manual.

(4) If applicable, do a check of decorative surfaces for scratches, dents or marks.

# REPAIR - GENERAL

1. Content

   A. Repair, refinish and replacement procedures are included in separate repair sections as follows:

| NAME | REPAIR |
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| SANDWICH AND LAMINATE PANELS | 1-1, 1-2 |
| DECORATIVE SURFACES | 2-1 |
| THERMOPLASTICS | 3-1 |
| TEXTILES | 4-1 |
| SHEET AND MAT MOLDED PARTS | 5-1 |
| SILICONE FOAM AND SPONGE | 6-1 |
| SILICONE RUBBER | 7-1 |
| POTTED INSERT REPLACEMENT | 8-1 |
| INSULATION | 9-1 |
| COMMON PROCEDURES FOR PACKBOARDS | 10-1 |

2. Standard Practices

   A. Refer to the following standard practices, as applicable, for details of procedures in individual repairs.

   20-30-03 General Cleaning Procedures
   20-30-91 Solvents for Final Cleaning of Composites Before Non-Structural Bonding (Series 91)
   20-41-05 Application of Corrosion Inhibiting Compounds
   20-50-12 Application of Adhesives
   20-60-01 Cleaning Materials
   20-60-02 Finishing Materials
   20-60-04 Miscellaneous Materials

3. Materials

   A. Abrasive Paper -- Grits 80, 100, 150, 220, 240, 320, 400, 600

   B. Adhesives -- Types 48, 50 (Permabond 102) 60, 70, 72, 79, 99 (Ref 20-50-12)

C. Buffing Wheel -- Cotton flannel

D. Buffing Compound -- Learok S-30 or 888, V75554

E. Catalysts

(1) Benzoyl peroxide in tricresyl phosphate base

(a) Garox BZP, V22401

(b) Luperco ATC or AFR paste, V0B1N6

(2) Methyl ethyl ketone peroxide, 60 percent in dimethyl phthalate liquid

(a) Lupersol DDM-9, V0B1N6

F. Cheesecloth, lint free -- BMS 15-5

G. Coating -- Krylon No. 1311, V87187

H. Filler -- BMS 5-136

I. Foam -- BMS 8-133

J. Glass Fabric -- BMS 9-3, Types H, H-2, H-3

K. Honeycomb Core -- BMS 8-124

L. Ink -- BMS 10-73, BMS 10-107

M. Laminate, Tedlar -- BAC5596, Types 13, 14

N. Potting Compound -- BMS 5-28, Types 9, 15, 16, 17, 18, 19, 28

O. Primer -- Sherwin Williams E61WC40 Polane, V54636

P. Release Film -- FEP, V18873

Q. Resins

(1) BMS 8-201, Type 2

(2) Hetron 92, V29672, V60016 or V70304

(3) Hysol TE1005 with Hysol 3561 hardener, V1JB33

R. Solvents

(1) Butyl carbitol, V36346

(2) Solvents or cleaners per D6-7127 for interior painted and plastic surfaces (Ref SOPM 20-30-03)

(3) Series 91 solvent (Ref SOPM 20-30-91)

S. Tape, Insulation -- 0T-6, 0T-26, 0T-26B, V60815

T. Tape -- Masking (Ref 20-60-04)

4. Vendors

VOB1N6 ATOFINA PETROCHEMICALS INC
15619 HFJ BKVD
HOUSTON, TEXAS 77267

V1JB33 DEXTER CORPORATION, THE HYSOL DIVISION
1 DEXTER DRIVE
SEABROOK, NEW HAMPSHIRE 03874

V22401 RAM CHEMICAL DIV OF WHITTAKER CORP
210 EAST ALONDRA BOULEVARD
GARDENA, CALIFORNIA 90248-2808

V29672 ASHLAND CHEMICAL CO., INDUSTRIAL CHEMICALS AND SOLVENTS DIV
8901 OLD GALVESTON ROAD, PO BOX 34567
HOUSTON, TEXAS 77034-3939

V36346 UNION CARBIDE CORPORATION, LINDE DIVISION
39 OLD RIDGEBURY ROAD
DANBURY, CONNECTICUT 06817-0001

V54636 SHERWIN-WILLIAMS CO
101 PROSPECT AVENUE NORTH WEST
CLEVELAND, OHIO 44115-1042

V60016 ASHLAND OIL, INC, ASHLAND CHEMICAL CO DIV
831 FIFTH AVE SOUTH
KENT, WASHINGTON 98031

V60815 ORCON CORPORATION
1570 ATLANTIC STREET
UNION CITY, CALIFORNIA 94587-2006

V70304 ASHLAND CHEMICAL CO GENERAL POLYMERS DIV
11524 WEST ADDISON STREET
FRANKLIN PARK, ILLINOIS 60131

V75554 JASON INC., JACKSONLEA UNIT
75 PROGRESS LANE
WATERBURY, CONNECTICUT 06705

V87187 BORDEN INC CHEMICAL DIV KRYLON DEPT
630 EAST WASHINGTON PO BOX 390
NORRISTOWN, PENNSYLVANIA 19404

## SANDWICH AND LAMINATE PANELS - REPAIR 1-1

1. General

   A. Use these procedures to repair structural damage to the sandwich or laminate panels. Then repair the decorative surface per REPAIR 2-1.

   B. Because decorative surfaces on complex contoured and acoustic panels cannot be repaired, be sure to make an analysis of all of the necessary repairs to the part before you start to repair it.

2. Small Dents and Scratches

   NOTE: This procedure is for damage that does not go through the skins, with the scratches or dents less than 0.005 inch deep.

   A. Clean off contamination and moisture from the surface.

   B. Wipe the area with butyl carbitol.

   C. Repair the damaged surface with BMS 5-136 surface filler per REPAIR 1-2.

3. Small Holes and Gouges

   NOTE: This procedure is for damage less than 0.5 square inch which goes through the skin, and core damage less than 0.5 square inch.

   A. Remove contamination and unwanted skin and core material from the damaged area with a knife and 240-grit sandpaper.

   B. Clean the area with cheesecloth wet with butyl carbitol.

   C. Dry the area with clean cheesecloth.

   D. Fill the damaged area with BMS 5-28 potting compound. In order of preference, use Type 28, 9, 18, 15, 16, or 17. Cure for 7 days at 75-79°F. Repair the damaged area with BMS 5-136 surface filler per REPAIR 1-2.

   E. Repair the damaged area with BMS 5-136 surface filler per REPAIR 1-2.

4. Large Holes and Gouges in Laminates (Fig. 601)

NOTE: This procedure is for damaged areas larger than 0.5 square inch but smaller than 100 square inches.

A. Remove damaged plies from the area.

B. Sand the edges of the damaged area to an angle as shown.

C. Clean all of the area with cheesecloth wet with butyl carbitol.

D. Dry with clean cheesecloth.

E. Cut plies of BMS 9-3 glass fabric to fit the prepared area, with allowance for overlaps as shown. For each ply, use the same type of BMS 9-3 fabric as the plies to be replaced in the damaged area. If exact replacement is not possible, use Type H, H-2, or H-3 as applicable.

F. Brush BMS 8-201 Type 2 resin on the prepared edges and also on the smallest ply. Install the smallest ply on the repair area. Then continue with each larger ply until each ply is replaced.

G. Apply FEP release film to the repair area. Apply a pressure of 10 pounds per square inch of repair area. Cure the resin at 70-80°F for 8 hours.

H. Repair the surface with BMS 5-136 surface filler per REPAIR 1-2.

5. Large Holes and Gouges in Sandwich Panels (Fig. 601)

NOTE: This procedure is for damaged areas larger than 0.5 square inch, but smaller than 100 square inches.

A. Remove the damaged skins from the area, and more skin to expose 0.5 inch of serviceable core around the edge of the damaged core.

B. Remove the damaged core material. With sandpaper, blend out the damaged area 2 inches all around the edges into the serviceable core material.

C. Clean all of this area with cheesecloth wet with butyl carbitol.

D. Dry with clean cheesecloth.

E. Cut and install a piece of core material to agree with the removed core. As applicable, use BMS 8-124 honeycomb core or BMS 8-133 foam. If the piece is larger than 3 inches diameter, make the ribbon direction agree with that of the repair area and install the piece with Type 70 adhesive.

F. Cut plies of BMS 9-3 glass fabric to fit the prepared area, with allowance for a minimum of 0.5 inch overlap around the edges. For each ply, use the same type of BMS 9-3 fabric as the plies to be replaced in the damaged area. If exact replacement is not possible, use Type H, H-2, or H-3 as applicable.

G. Brush BMS 8-201 Type 2 resin on the repair area and also on the smallest ply. Install the smallest ply on the repair area. Then continue with each larger ply until all plies are replaced.

H. Apply FEP release film to the repair area. Apply a pressure of 10 pounds per square inch of repaired area. Core the resin at 70-80°F for 8 hours.

I. Repair the surface with BMS 5-136 surface filler per REPAIR 1-2.

6. Separation Between Plies or Skins

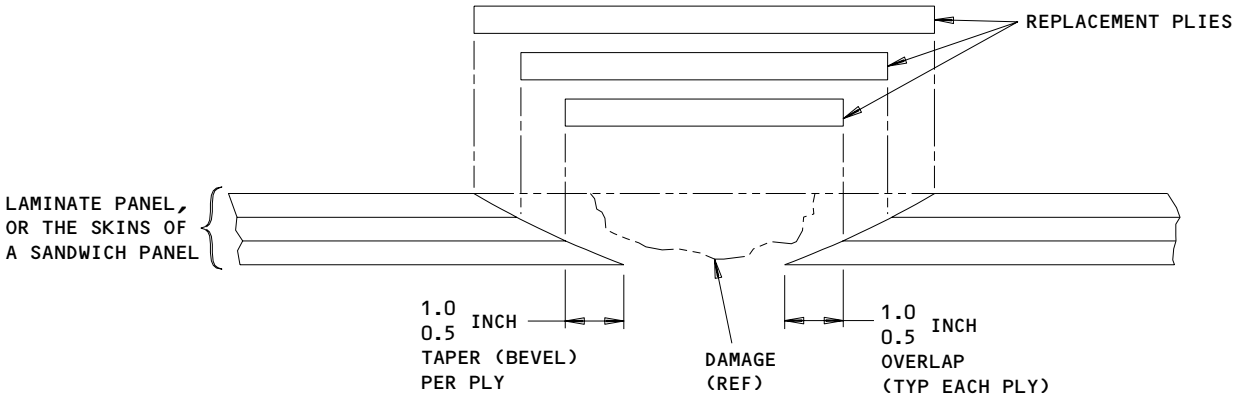
NOTE: This procedure is for damaged areas smaller than 4 square inches. For areas larger than 4 square inches, use the procedure for large holes and gouges in laminates, par. 4. above.

A. Make a small hole into the damaged area. If the damaged area is not at the edge of the panel, also make an air vent hole.

B. Inject BMS 8-201, Type 2 resin into the damaged area through the hole.

C. Apply release film to the area. Apply a pressure of 10 pounds per square inch of repaired area. Cure the resin at 70-80°F for 8 hours.

D. Repair the surface with BMS 5-136 surface filler per REPAIR 1-2.




Hole Preparation and Ply Replacement
Figure 601

A72748

## SURFACE REPAIR - REPAIR 1-2

1. General

   A. Use this procedure to repair the surface of the panel with BMS 5-136 surface filler.

   B. If heat and smoke release regulations are applicable, do not use this procedure if the width of the filler will be more than 3 inches, or if the total amount of filler will be more than 100 square inches on one panel. If the panel cannot be repaired within these limits, then apply BAC 5596 Type 13 decorative laminate over the repair, or discard the panel and use a replacement panel.

2. Surface Repair

   A. If the surface has a layer of BMS 10-11, Type 2 enamel, remove the gloss with abrasive paper or equivalent.

   B. Clean the surface with butyl carbitol. Remove wet solvent with a dry cloth.

   C. Prepare BMS 5-136 surface filler by the manufacturer's instructions.

   D. Apply the filler with a spatula or an extrusion gun. Be careful not to catch air under the filler. Immediately remove unwanted filler.

   E. Give protection to adjacent areas with masking tape per 20-44-02, Type 4.

   F. Let the filler cure 20-40 minutes at 65-85°F.

   G. With aluminum oxide sandpaper only, sand to the correct dimensions and surface roughness. Use 80 grit paper or finer for rough sanding, then use 240 grit or finer for final sanding. Be careful not to sand through primer or decorative layers, or more repair will be necessary.

   H. Remove masking tape.

## DECORATIVE SURFACES - REPAIR 2-1

1. Scuff Marks and Light Scratches

   NOTE: This procedure is for damage less than 0.250 inch in diameter and less than 0.005 inch deep.

   A. Clean the damaged area with cheesecloth wet with butyl carbitol.

   B. Remove scratches and marks with a cotton flannel fabric buffing wheel and Learock S-30 or 888 buffing compound.

   C. Blend out the edges of the repair until you get a continuous glossy surface.

   D. If necessary, apply BMS 10-73 or BMS 10-107 ink, or BMS 10-83 enamel, of the correct color. Let this air dry for 15 minutes.

   E. If necessary, polish the area again per step B. above.

2. Small Holes and Gouges in Nonacoustic Decorative Laminates

   NOTE: This procedure is for panels which are flat or have easy contours, and when damage to skin and core was repaired per REPAIR 1-1.

   A. Remove trim strips from the panel.

   B. Sand the surface with 80-grit paper to remove the gloss.

   C. Clean all of the surface with cheesecloth wet with butyl carbitol.

   D. Dry with clean cheesecloth.

   E. We recommend you use BAC5596 Type 13 decorative laminates and Type 72 adhesive unless a pressure sensitive adhesive is necessary. Then use BAC5596 Type 14 laminates and BMS 5-91 adhesive.

   F. Remove the release paper from the laminate immediately before use.

   CAUTION: MAKE SURE YOU PUT THE PATTERN IN THE CORRECT DIRECTION BEFORE YOU APPLY THE LAMINATE. SEE THAT THE REPLACEMENT PATTERN AGREES WITH THE PATTERN ON THE PANEL.

G. Apply the laminate to the surface. Be careful not to catch air under the laminate. As you rub the laminate on, you can use heat to help the laminate touch all of the surface. Do not get the laminate get hotter than 200°F, or the laminate texture could change or go away.

H. Vacuum form BAC5596 Type 13 laminates for 30 minutes at 180°F. For BAC5596 Type 14 laminates, the vacuum and heat cure is not necessary, but is recommended when possible.

I. If you use vacuum, let the panel cool to below 90°F before you remove the vacuum.

J. Cut the edges of the laminate to the correct size. Install the trim strips.

3. Small Holes and Gouges in Painted Surfaces

NOTE: Damage to skins or core must be repaired per REPAIR 1-1 before you you repair the painted surface.

The paint layer after repair must not be thicker than 0.036 inch (3.6 mils) on sandwich panels, or 0.018 inch (1.8 mils) on laminate panels.

A. Remove trim strips from the panels.

B. With sandpaper, remove contamination from the damaged area.

C. As necessary, repair the surface with BMS 5-136 surface filler per REPAIR 1-2.

D. Apply E61WC40 Polane primer to the area.

E. Apply the topcoat of the correct color.

F. Install the trim strips.

4. Small Holes and Gouges in Glass Reinforced Decorative Laminates

A. If there is damage to the glass skins or laminate, repair the damage per REPAIR 1-1.

B. Repair the damaged decorative surface per par. 2. above.

5. Particles Under Decorative Laminates

NOTE: The particle size must be smaller than 0.0625-inch diameter.

A. Method 1 (Preferred)

(1) Solvent clean the damaged area per SOPM 20-30-03.

(2) Put a piece of clean mylar film over the particle.

(3) Carefully push the particle into the panel. Be careful not to damage the Tedlar surface.

B. Method 2 (Optional)

(1) Solvent clean the damaged area per SOPM 20-30-03.

(2) Make a small cut into the laminate

(3) Lift the laminate back and remove the particle.

(4) Apply Permabond 102 adhesive to the two mating surfaces per SOPM 20-50-12, Type 50.

(5) Put the mating surface together. Apply pressure to make sure the surfaces fully touch. Do not make air pockets or wrinkles.

(6) Wipe off unwanted adhesive. Sand the area smooth with 600 grit sandpaper.

(7) Apply BMS 10-73 ink, BMS 10-70 ink, or BMS 10-83 paint of the correct color to the area. Cab-o-sil can be added to the ink or paint as a filler if necessary.

(8) Spray a light layer of Krylon matte finish No. 1311 to control the surface gloss, as necessary.

6. Dents

NOTE: The dent must be less than 0.250 inch diameter.

A. Solvent clean the damaged area per SOPM 20-30-03.

B. Apply heat with a heat gun, 6-8 inches above the decorative surface, for approximately 30 seconds in a circular pattern.

C. Repair the damaged decorative area with BMS 5-136 surface filler per REPAIR 1-2.

D. Lightly sand the area with 220 grit or finer sandpaper.

E. Wipe the area with solvent to remove sand and unwanted material.

F. Apply BMS 10-73 ink, BMS 10-107 ink, or BMS 10-83 paint of the correct color to the damaged area with BMS 8-39 foam. Cab-o-sil can be added to this ink or paint as a filler if necessary.

G. Apply one more layer of ink or paint without Cab-o-sil.

H. Spray a light layer of Krylon matte finish No. 1311 to control surface gloss as necessary.

THERMOPLASTICS - REPAIR 3-1

1. Badly - Drilled Holes

NOTE: This procedure is for bad holes less than 0.5 inch diameter which cannot be seen when the part is installed in the airplane.

A. Fill the hole with BMS 5-28 potting compound. In order of preference, use Type 28, 9, 18, 15, 16, or 17. Cure for 7 days at 75-79°F or 5 hours at 120-130°F. Or as an alternative fill the hole with Type 70 adhesive per 20-50-12.

B. Repair the surface with BMS 5-136 surface filler per REPAIR 1-2.

C. Repair the decorative surface per REPAIR 2-1.

2. Scratches and Small Cracks

NOTE: This procedure is for damage less than 0.005 inch deep on other than textured surfaces.

A. Fill the damage with BMS 5-28 potting compound. In order of preference, use Type 28, 9, 18, 15, 16, or 17. Cure for 7 days at 75-79°F or 5 hours at 120-130°F.

B. Repair the surface with BMS 5-136 surface filler per REPAIR 1-2.

C. Repair the decorative surface per REPAIR 2-1.

3. Cracks

NOTE: This procedure is for cracks more than 0.005 inch deep which cannot be seen when the panel is installed in the airplane. The total area of the fiberglass must be no larger than 100 square inches.

A. Repair the blind (rear) side of the panel with fiberglass fabric and Hysol resin as follows:

(1) On polycarbonate, polysulfone, or polyetherimide plastics, solvent clean the area per 20-30-03. Sand the surface to remove all gloss with 80-100 grit abrasive. Then solvent clean the surface again.

(2) On polyetherketone ketone plastics, solvent clean the area per 20-30-03. In a ventilated booth or hood, apply a thin layer of BMS 5-127 adhesive as a primer. Let this primer dry in the ventilated booth or hood.

(3) Cut a piece of BMS 9-3 fiberglass fabric to fit the damaged area. Use Types H, H1 through H4, classes 3, 4, or 7, as applicable.

(4) Mix 100 parts by weight of TE 1005 resin with 15-17 parts by weight of HD3561 hardener. The pot life of this resin mix is 100 minutes maximum.

(5) Apply a layer of the mixed resin to the prepared surface. Then apply one ply of the fiberglass fabric, and apply one more layer of mixed resin on the fiberglass fabric. Carefully work the the resin into the fabric to fully wet the fabric and remove caught air. As an alternative, you can put the resin into the fiberglass fabric before you apply the fabric to the surface.

(6) On polycarbonate or polysulfone plastics, add more layers of fiberglass fabric and resin, if necessary. On polyetherimide and polyetherketone ketone plastics, only one layer of fiberglass is permitted.

(7) Cure the resin-repaired area for 24 hours minimum at 67°F minimum. As an alternative, polyetherketone ketone parts can be cured for 3 hours minimum at 140-160°F.

B. Repair the other (front) surface of the panel with BMS 5-136 surface filler per REPAIR 1-2.

C. Repair the decorative surface per REPAIR 2-1.

TEXTILES - REPAIR 4-1

1. General

A. If damage to textiles can be cleaned away, clean by the usual procedures.

B. Replace the item if damage cannot be repaired by cleaning.

## SHEET AND MAT MOLDED PARTS - REPAIR 5-1

1. Cracks in Ribs

   NOTE: This procedure is for cracks as much as 1 inch long.

   A. Solvent clean the area with butyl carbitol.

   B. With 150-220 grit paper, sand the area of the defect and 1 inch or more around it. Also include all surfaces which will be covered with a patch.

   C. Remove sand and unwanted matter with a dry cloth or paper towel.

   D. Cut a piece of BMS 9-3, Type H fiberglass cloth to a size that covers the defect and a minimum of 0.5 inch more on each side, and which will cover the two sides of the rib down to the flat surface of the panel.

   E. Prepare BMS 5-92 Type 1 adhesive per SOPM 20-50-12 Type 70, but use 58 parts resin to 42 parts catalyst. Apply a thick layer of the mixed adhesive to the top edge and the two sides of the rib. Push the fiberglass cloth into position while the adhesive is soft.

   F. Apply a minimum of 20 inches Hg vacuum.

   G. Cure the adhesive 24 hours at 65-85°F.

2. Edge Cracks and Holes

   NOTE: This procedure is for cracks as much as 0.75 inch long and holes as large as 0.75 inch diameter.

   A. Drill stop holes at the ends of the cracks.

   B. Remove the damaged material. Bevel cracks 15-45° with the surface of the panel. Bevel holes approximately three times the hole diameter.

   C. Sand an area 1-2 inches out from the edges of the bevels.

   D. Mix 67 parts by weight of Hetron 92 resin with 33 parts by weight of fiberglass cloth cut into 0.5 inch squares. Mix in 0.625 part by weight (that is, only 0.625 weight percent) of MEK peroxide. The pot life of this is 60 minutes.

   E. With a trowel, push the mix into the hole or crack.

F. Apply parting film to the rear surface of the repair, and then put an aluminum sheet down on the film. Then apply a pressure of 10 pounds per square inch of repaired area.

G. Cure the resin 24 hours at 60-95°F.

3. Void, Resin-Starved Areas and Porosity

NOTE: This procedure is for voids no more than 0.020 inch deep, resin-starved areas 0.125 square inch or smaller, and porosity no more than 0.020 inch deep on no more than 5% of the surface. But these defects must be only on nondecorative parts. Such defects on textured decorative surfaces cannot be repaired.

A. Solvent clean the area with butyl carbitol.

B. Make the area rough with 150-220 grit paper.

C. Remove sand and unwanted matter with a dry lint-free cloth.

D. Mix the two components of BMS 5-136 surface filler by the manufacturer's instructions until the color is constant.

E. Fill the defective area with the mixed filler. Cure 20-40 minutes at 65-85°F.

F. Sand the cured filler smooth with the adjacent surface.

## SILICONE FOAM AND SPONGE - REPAIR 6-1

NOTE: These repairs are for BMS 1-60, 1-68 and 1-69 material.

1. Cuts and Tears

   NOTE: This procedure is for damage 1 inch maximum, and no more than 1 cut in each foot of material, in areas that cannot be seen when the item is installed in the airplane.

   A. Solvent clean the area with butyl carbitol.

   B. Apply a continuous layer of Type 60 or 79 adhesive to one or two mating surfaces.

   C. Push the surfaces together to make a good bond, with a bondline thickness of 0.015 inch (15 mils).

2. Scuffs or Marks

   A. These defects cannot be repaired. Replace the part.

3. Swelling

   A. Replace the part if the swelling does not go away in 30 minutes.

## SILICONE RUBBER - REPAIR 7-1

NOTE: These repairs are for BMS 1-59 and 1-63 material.

1. Cuts and Tears, Scuffs

   A. These defects cannot be repaired. Replace the part.

2. Marks

   A. Clean the part with butyl carbitol or soap and water.

   B. If this does not remove the marks, replace the part.

3. Swelling

   A. Replace the part if the swelling does not go away in 30 minutes.

4. Silicone Ducts

   A. Defective flexible and semi-rigid air ducts with silicone coating per BMS 8-17 or 8-250 cannot be repaired. Silicone ducts are low cost parts. Replace the part if it is necessary.

## POTTED INSERT REPLACEMENT - REPAIR 8-1

1. Hole Preparation

   A. Method 1 -- Skin Damaged

      (1) Cut around the insert from the back side with a hole saw or equivalent. Heat the insert to make the adhesive soft. Remove the insert.

      (2) Repair the core and the skin to put a new surface where the hole was. Refer to applicable REPAIR sections.

      (3) Make a new hole for the insert at the correct location. For a blind insert, make the hole approximately 0.040 inch deeper than the length of the insert.

      (4) Install a good insert per par. 2.

   B. Method 2 -- Skin Not Damaged

      (1) Heat the insert to make the adhesive soft. Remove the insert.

      (2) Remove old adhesive from the hole. Clean the hole with solvent.

      (3) Install a good insert per par. 2.

2. Insert Installation

   A. Remove loose particles and dust with clean dry air or a vacuum method.

   B. Use masking tape to give protection to adjacent decorative surfaces.

   C. Prepare BMS 5-28, Type 18 or Type 19 potting compound as specified in the manufacturer's instructions.

   D. If the hole goes all the way through the panel but the insert does not, be sure to block off the hole at the rear side of the panel (Fig. 601).

   E. If the insert has a shoulder that goes in past the top skin of the panel, put all of the required potting compound into the hole. If the insert does not have this shoulder, you can either fill the hole with 60-90% of the required potting compound, or put the insert in first without the compound. (Most of these inserts have tabs.)

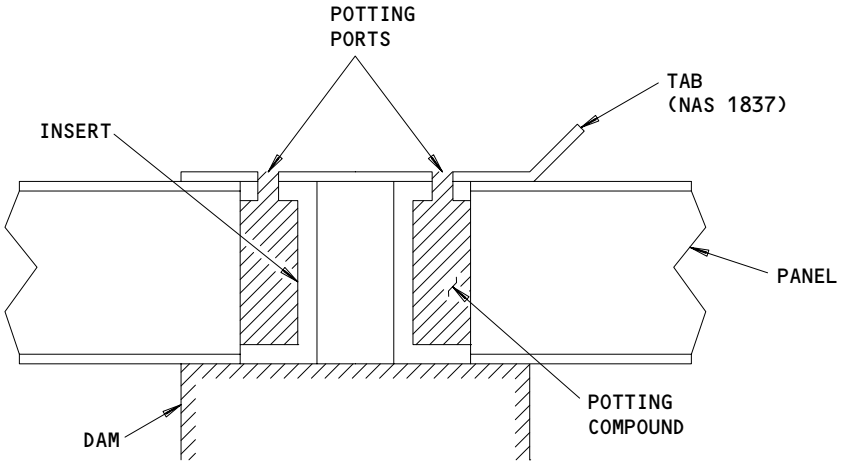
F. Install the insert into the prepared hole. For inserts without the shoulder per par. E., inject potting compound into the hole at one alignment tab until the compound comes out the hole at the other alignment tab.

G. Remove unwanted potting compound with a gauze pad wet with solvent. On nondecorative surfaces, use a Series 91 solvent. On decorative surfaces, use butyl carbitol.

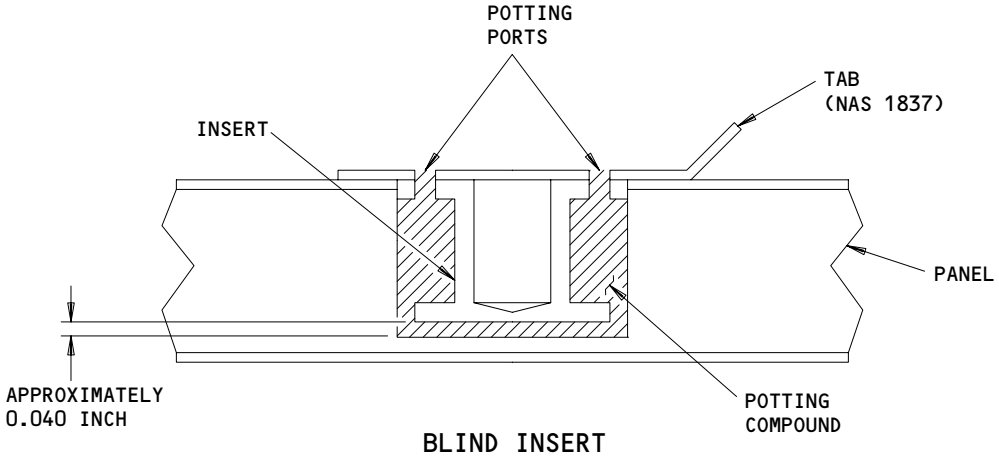
H. Cure the potting compound for a minimum of 5 hours at 120-130°F, or 7 days at 75-79°F.

I. After the cure, remove alignment tabs and protective materials. But do not put any load on the inserts for at least 24 hours after installation.

J. Examine the insert for correct installation. If the insert is at an angle or not smooth with the face of the panel, remove the insert and do the replacement procedure again.




THROUGH INSERT




BLIND INSERT

Typical Insert Installations
Figure 601

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INSULATION - REPAIR 9-1

CAUTION: IF THE INSULATION BLANKET HAS CONTAMINATION BY CORROSION INHIBITING COMPOUNDS, IT MUST BE CLEANED PER SOPM 20-41-05, OR REPLACED.

1. Small Punctures and Tears

NOTE: This procedure is for defect smaller than 25 percent of the total area of the blanket, for insulation materials BMS 8-48, 8-115, or 8-142.

A. If there is damage to the fiberglass batting, replace the damaged batting with new batting before you repair the cover.

B. Method 1 -- Cover Repair with a Piece of Fabric.

(1) Solvent clean the damaged area with butyl carbitol.

(2) Cut a piece of fabric of equivalent material to make a patch for the damaged cover. Make the patch dimensions 1 inch or larger in all directions than the area of the defect.

(3) Apply Type 48 adhesive to the mating surfaces of the patch and the cover.

(4) Install the patch on the defect. Push down to make a good bond.

C. Method 2 -- Repair of BMS 8-142 Blankets with Tape (Optional)

(1) As an alternative to Method 1 repair, repair the damaged area with Orcon OT-26, OT-26B, or OT-6 insulation tape.

## COMMON PROCEDURES FOR PACKBOARDS - REPAIR 10-1

1. General

A. This section contains repairs for graphite packboards. This section describes repairs made using room temperature/150°F (66°C) cure materials (wet layup).

NOTE: The repairs called for in this section are wet layup repairs. These repairs require rapid use of catalyzed resin materials. Room temperature wet layup repairs will not return the structure to its original strength or durability. A periodic inspection plan for the repaired area may be required. For size and limits of such repairs, see applicable repair section.

The repairs in this section are room temperature repairs, the cure of which may be accelerated by the application of heat as specified herein. To obtain maximum properties, cure repair at 150°F (66°C).

B. Index of subjects in par. 3 and 4.

| Paragraph | Subject |
|---|---|
| 3. | Common Procedures for Packboard Repairs |
| 3.A. | Determine Damage |
| 3.B. | Remove Water from Damaged Area |
| 3.C. | Remove and Prepare Damaged Area |
| 3.D. | Fabricate, Clean, and Install Honeycomb Replacement Core Plug |
| 3.E. | Prepare and Apply Repair Plies |
| 3.F. | Layup/Bagging Procedures (Fig. 607) |
| 3.G. | Cure the Repair |
| 3.H. | Refinish after Repair |
| 3.J. | Perform Post-Repair Requirements |
| 4. | Typical Packboard Repairs |
| 4.A. | Repair of Delaminations Between Plies |
| 4.B. | Repair of Puncture, 0.50-inch Diameter or Less, in Honeycomb Panel (Fig. 612) |
| 4.C. | Repair of Damage to One Skin and Honeycomb Core using Replacement Core Plug, Punctures Greater than 0.50-inch Diameter (Fig. 605) |
| 4.D. | Repair of Large Puncture through Internal and External Surface of Panel including Core Damage (Fig. 606) |
| 4.E. | 150°F (66°C) cure (wet layup) Repair of Damaged Panel Attach Holes in Honeycomb Panel Edgebands or along Edges of Laminated Panels (Fig. 610) |
| 4.F. | Repair of Surface Dents (Fig. 613) |
| 4.G. | Repair of Resin Crack in One Skin (Fig. 614) |

Index of Subjects in Paragraphs 3. and 4.
Table I

2. General

WARNING: HEAT, FIRE, OR SPARKS CAN CAUSE AN EXPLOSION. USE EXPLOSIONPROOF EQUIPMENT WHEN PERFORMING THESE REPAIRS. NONCOMPLIANCE COULD CAUSE PERSONNEL INJURY.

BREATHING VAPORS OR ALLOWING SOLVENT TO CONTACT SKIN OR EYES IS HAZARDOUS. WEAR NEOPRENE GLOVES WITH COTTON LINERS, PROTECTIVE CLOTHING, AND EYE GOGGLES. IF CHEMICAL CONTACT OCCURS. WASH THOROUGHLY WITH WATER. IF CHEMICAL SHOULD SPLASH INTO EYES, FLUSH EYES WITH LARGE QUANTITIES OF WATER AND SEEK MEDICAL AID. USE MECHANICAL VENTILATION OR RESPIRATORY PROTECTION WHEN WORKING IN A CONFINED SPACE OR AREA.

CAUTION: WHEN FASTENERS ARE USED IN GRAPHITE COMPOSITE STRUCTURE THEY MUST BE TITANIUM OR CORROSION RESISTANT STEEL. THEY CAN BE BARE, ALUMINUM COATED, OR, -IN THE CASE OF CRES-CADMIUM PLATED. ALUMINUM OR ALLOY STEEL FASTENERS ARE NOT ALLOWED IN GRAPHITE COMPOSITE STRUCTURE.

WHEN REINSTALLING ALUMINUM FITTINGS ON GRAPHITE COMPOSITE STRUCTURE, MAKE SURE THAT THE ORIGINAL CORROSION PROTECTIVE TREATMENT, FAYING SURFACE SEAL, IS APPLIED. BMS 5-26 IN FUEL TANK AREAS, AND BMS 5-95 IN ALL OTHER AREAS.

A. Use suitable holding fixtures for large repairs to prevent distortion of the structure.

B. Perform the repair procedures specified herein only in areas of reasonable cleanliness. Areas containing oil mist, exhaust fumes, gases, soot, rain, dust, or other particulate matter are specifically prohibited.

C. Protect surfaces from contamination. Do not touch cleaned parts or adhesive with bare hands. Use clean white gloves when handling parts.

D. See Fig. 601 for resin mixes and potting compound data.

3. Common Procedures for Packboard

A. Determine Damage

CAUTION: CHEMICAL PAINT STRIPPERS WILL ATTACK RESIN SYSTEMS, AND SHOULD NOT BE USED TO REMOVE PAINT BEFORE MAKING DAMAGE EVALUATIONS.

(1) Examine visually for extent of damage.

(2) Check panel in vicinity of damage for entry of water, oil, fuel, dirt or other foreign matter. Water can be detected by radiographic methods. Remove contaminants as required.

(3) Check for delamination and/or disbonding from core around the damage.

NOTE: Post repair inspection is recommended. Examples of inspection procedures are given in NDT Part 1, 51-01-01 of the applicable NDT Manual.

B. Remove Water From Damaged Area

(1) Remove water from honeycomb sandwich (Fig. 602).

(a) Remove damaged skin plies to open up honeycomb area in the damaged area. Remove standing water using vacuum or oil-free compressed air.

(b) Sand the core to remove the adhesive. Removal of adhesive fillets on core is not required.

(c) Apply a fiberglass or a metal fine mesh screen over the exposed core.

(d) Apply a thermocouple to the center of the screen.

(e) Apply a layer of glass fabric bleeder cloth over the screen and hold in place with masking tape.

(f) Place a vacuum line on the edge of the bleeder cloth and hold in place with masking tape.

(g) Apply a thermocouple and heating blanket to the far side of the honeycomb sandwich panel.

(h) Place extruded sealing compound around the entire area and seal the area with vacuum bag material.

(i) Evacuate the layup to a minimum 22 inches of mercury vacuum.

(j) Heat the area for 1 hour minimum at 150°F (66°C) to 170°F (77°C). The rate of temperature rise must not exceed 5°F (3°C) per minute.

(k) Remove layup materials and proceed with repair procedure.

(2) Remove water from solid laminate.

(a) Remove damage and/or delamination. Remove standing water using vacuum and oil-free compressed air.

(b) Heat the area for 1 hour minimum at 150°F (66°C) to 170°F (77°C). The rate of temperature rise must not exceed 5°F (3°C) per minute.

C. Remove and Prepare Damaged Area

(1) Damage Removal

(a) Trim out the damaged lamination to a smooth shape with rounded corners, or a circular or oval shape. Take care not to damage the undamaged plies, core or surrounding material.

NOTE: Remove only damaged plies, damaged doublers and damaged fillers.

(b) When the core is also damaged, remove the core by trimming to the same outline as the skin.

NOTE: When a potted core repair is to be made, removal of damaged core is not required.

(c) In areas, where contamination cannot be removed by cleaning or drying, remove the contaminated structure along with the other damage.

(d) When opposite inner skin is also damaged, trim out the damage to a smooth rounded shape.

(e) When core is removed from the inner surface of opposite skin, carefully smooth core down to adhesive film.

(f) Inspect cut out area to ensure that all damage has been removed.

CAUTION: SANDING FOR ADHESION OR FINISH REMOVAL MUST NOT EXPOSE OR DAMAGE FILAMENTS IN THE UNTAPERED SURFACE REPAIR AREA.

SANDING MUST NOT EXPOSE OR DAMAGE FILAMENTS IN EACH PLY WHEN STEP SANDING OR IN THE PLY BONDED TO THE CORE (FIG. 603).

LOSS OF STRUCTURAL STRENGTH OF THE COMPONENT WILL OCCUR IF THESE CAUTIONS ARE NOT OBSERVED.

DO NOT USE PAINT STRIPPERS FOR THE REMOVAL OF FINISH. DAMAGE TO THE ADHESIVE RESIN SYSTEM WILL OCCUR.

(2) Preparation of Damaged Area (Fig. 603)

(a) Determine the number of plies that have been cut. Mask off the area around the cleaned up damage allowing 0.5 inch overlap for each ply replacement, plus 0.5 inch extra for each extra ply and ensure that the existing top ply is completely covered by the repair.

NOTE: Where the number of plies is not apparent, refer to the component drawing.

WARNING: SANDING GIVES OFF A FINE DUST THAT MAY CAUSE SKIN IRRITATIONS. BREATHING OF AN EXCESSIVE AMOUNT OF THIS DUST MAY BE INJURIOUS. OBSERVE PRECAUTIONS FOR SKIN AND RESPIRATION PROTECTION.

EXPLOSIONPROOF EQUIPMENT MUST BE USED WHERE THE POSSIBILITY OF VAPOR IGNITION EXISTS. NONCOMPLIANCE COULD CAUSE PERSONNEL INJURY.

(b) Surface of Panel

1) Taper sand each ply or simply abrade the surface around the cleaned up damage a minimum of 0.5 inch per ply. See Fig. 603.

2) Abrade surfaces around repair using No. 240 or finer Scotch-Brite abrasive.

3) Remove exterior finishes, including enamel finish and conductive coating from the surface of the 1.0 border using No. 150 or finer sandpaper.

(c) Cleaning of repair area.

1) Remove all sanding dust by applying oil-free compressed air and use a vacuum cleaner.

WARNING: BREATHING VAPORS OR ALLOWING SOLVENT TO CONTACT SKIN OR EYES IS HAZARDOUS. HEAT, FIRE OR SPARKS CAN CAUSE AN EXPLOSION. USE MECHANICAL VENTILATION OR RESPIRATORY PROTECTION WHEN WORKING IN A CONFINED SPACE OR AREA. AVOID CONTACT WITH SKIN EYES AND CLOTHING. WEAR EYE PROTECTION. KEEP AWAY FROM SOURCES OF HEAT, FIRE OR SPARKS.

CAUTION: DO NOT IMMERSE PARTS IN SOLVENT OR ALLOW STANDING SOLVENT ON PART. DAMAGE TO PART WILL OCCUR.

2) Wipe surfaces with a clean cloth moistened with solvent, Series 99 (AMM/SOPM 20-30-99). Allow solvent to evaporate before proceeding with the repair.

D. Fabricate, Clean, and Install Honeycomb Replacement Core Plug

(1) Fabricate core plug.

(a) Fabricate core plug. Refer to the packboard shell drawing to determine type, class, and grade of the original core.

(b) For butt-splicing, the honeycomb core plug should fit flush with original core and with ribbon direction the same as in original core. The replacement core must overlap to make contact with the cell walls of surrounding core material.

(c) For crush splicing, the honeycomb core plug should be made one to three cells (0.4 inch maximum) larger than the repair cavity (Fig. 604). The replacement core plug must be made from core material which is at least two grades denser than the original core.

(d) Trim core plug to full or partial depth of original core (par. 3.C.(1)(b)) (Fig. 605).

NOTE: Depth of core plug should allow for shrinkage during cure and for thickness of extra plies of fabric cloth between core plug and undamaged core or skin.

(2) Clean core plug.

WARNING: BREATHING VAPORS OR ALLOWING SOLVENT TO CONTACT SKIN OR EYES IS HAZARDOUS. HEAT, FIRE OR SPARKS CAN CAUSE AN EXPLOSION. USE MECHANICAL VENTILATION OR RESPIRATORY PROTECTION WHEN WORKING IN A CONFINED SPACE OR AREA. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. WEAR EYE PROTECTION. KEEP AWAY FROM SOURCES OF HEAT, FIRE OR SPARKS.

CAUTION: DO NOT EXCEED IMMERSION CRITERIA. FAILURE TO COMPLY WILL DAMAGE CORE MATERIAL.

DO NOT IMMERSE PARTS IN SOLVENT OR ALLOW STANDING SOLVENT ON PART. DAMAGE TO PART WILL OCCUR.

(a) Clean visually contaminated core by dipping (a maximum of four times) in an acetone or MEK bath for 60 seconds.

(b) Locally contaminated areas can be washed with MIBK, MEK, or acetone.

(c) The core must be completely dry, clean and free of evidence of solvents before installation.

(3) Install core plug (Fig. 604, 605, 606, 607).

(a) If one skin is undamaged, cut 2 plies of woven fabric that will fit on the inside surface of the undamaged skin (Fig. 604 and 605). Saturate the plies with Resin Mix 1, prepared as shown in Fig. 601, then position in core cavity.

(b) If both skins are damaged, apply a caul plate against the exterior surface of far side skin and tape in place.

(c) For butt splicing, spread Resin Mix 2, BMS 5-28, Type 7 with micro-balloons on the sides of the replacement core and the undamaged core that will mate when the plug is installed. Orient ribbon in the direction of original core ribbon.

(d) For crush splicing, prepare and install the core plug per Fig. 604. Orient ribbon in the direction of original core ribbon.

(e) Put the layup materials and equipment in place per Fig. 607 (Sheet 2).

(f) Evacuate the repair area to a minimum of 22 inches of mercury vacuum.

(g) Cure per Fig. 601.

(h) Sand repair core plug approximately flush with surrounding material, making allowance for film adhesive and slight core crush during cure.

(i) Vacuum to remove sanding residue from core cells.

NOTE: The above procedure is based on the core plug installation being cured separately from the repair plies. As an option, core plug installation and repair plies may be cured at the same time.

E. Prepare and Apply Repair Plies

NOTE: Refer to the following applicable paragraphs for preparation of glass and graphite fabrics.

CAUTION: USE OF PRECURED PATCHES IS NOT RECOMMENDED.

(1) Prepare glass fabric repair plies (BMS 9-3).

(a) Refer to the packboard shell drawing to determine number, style, and orientation of glass fabric used in original structure. Repair existing Style 1543 plies with Type F-2 plies. Repair existing Style 1581 plies with Type H-2 plies. Repair existing Style 7781 plies with Type H-3 plies (Fig. 608). Refer to specific structural component repair section for extra repair ply requirements (Fig. 609).

(b) From each type of material required, cut a piece that is large enough for cutting the required number of plies for the repair patch. Use one repair ply of glass fabric in the patch for each damaged glass ply of the original laminate.

NOTE: If extra plies are required, use materials listed in Fig. 609.

(c) Substitution of repair ply fabrics (Fig. 608).

(d) Impregnate repair plies with resin per par. (3).

(2) Prepare graphite fabric repair plies (BMS 9-8).

(a) Refer to the packboard shell drawing to determine number, style, and orientation of graphite fabric used in original structure.

(b) From each type of material required, cut a piece that is large enough for cutting the required number of plies for the repair patch. Use one repair ply for each damaged ply of the original laminate. Each repair ply must be of equivalent thickness and the same orientation as the original plies.

NOTE: If extra plies are required, use the materials listed in Fig. 609.

(c) No substitutes are permitted for graphite repair plies. However, two plies of graphite fabric may be used as a substitute for graphite tape.

(3) Impregnate repair plies with resin.

(a) Cut two pieces of parting film approximately 3.0 inches larger all around than the fabric. Tape one piece to a smooth surface.

NOTE: Use Teflon film or other parting films.

(b) Lay fabric onto parting film.

(c) Spread Resin Mix 1, prepared as shown in Fig. 601, to adequately cover fabric evenly.

(d) Cover the fabric on the parting film with the second piece of parting film.

(e) Press the resin through the fabric by working over the parting film with a squeegee or roller, in order to impregnate the fabric and to remove entrapped air.

(f) Work excess resin to edges of fabric such that fabric weave is barely visible.

NOTE: Resin content of the impregnated fabric shall be 55 ±5 percent by weight.

(g) Cut the impregnated fabric to the required sizes for each individual ply of the patch. The parting film on both sides of the fabric decreases fraying of the edges while cutting the fabric.

NOTE: Refer to Fig. 603 for required overlap of repair plies. The repair plies must be installed with the same orientation as that of the original plies being repaired. The filler ply over an exposed honeycomb core must be installed with the same orientation as the original surface ply. Other extra repair plies must be installed as specified in individual structural component repair sections.

(4) Apply repair plies (Fig. 605, 606, 607, 609, 610, 611, 612, 613, 614).

NOTE: Where the damage has occurred at a lap joint in the original laminates, it is not necessary to make a comparable lap in the repair plies. Where the original core was undamaged and was provided with a recess to match the lap joint, the recess should be filled with filler plies before application of the repair plies.

CAUTION: ENSURE THAT PARTING FILM IS REMOVED FROM REPAIR PLIES PRIOR TO LAYUP AND CURING. NONCOMPLIANCE WILL RESULT IN A RUINED REPAIR.

(a) Apply a coat of Resin Mix 1, prepared as shown in Fig. 601, over the repair area.

(b) Remove parting film from one side of the smallest ply of the patch and place the exposed face against the repair area with orientation as in original structure.

(c) Use a squeegee over the parting film that covers the patch to remove wrinkles and entrapped air. Do not apply excessive pressure. Excessive pressure will produce a patch deficient in resin.

(d) After removing parting film from the contact faces, place the next larger size ply of the impregnated patch over the ply on the repair area with proper orientation and with overlap all around per Fig. 603.

(e) Place succeeding plies of the patch as described in par. (c) and (d).

(f) Proceed to layup/bagging procedure.

F. Layup/Bagging Procedure (Fig. 607)

(1) Place a layer of dry peel ply over the wet layup repair patch. Cut the peel ply so it is large enough to contact the edge bleeder or surface bleeder.

(2) Place a layer of perforated FEP parting film (1 mil thick) over the layup. Cut the FEP so that the edges extend 3 inches beyond the edge of the repair.

(3) Secure three thermocouples (spaced evenly around repair) to the edge of the largest repair ply and connect them to the appropriate recorders.

(4) Place a layer of dry peel ply or Style 120 glass fabric (or equivalent thickness glass fabric) over the repair as a surface bleeder. Cut the surface bleeder so the edges extend 2.0 beyond the edge of the perforated FEP.

(5) Place a layer of solid FEP parting film (1 mil thick) over the surface bleeder. Cut the solid FEP so the edges are even with the edge of the perforated FEP.

(6) Place an optional metal caul plate (such as 0.016-inch thick aluminum) over the fiberglass bleeder. Make the caul plate slightly smaller than the bleeder. Omit this step if layup is for applying pressure for cure of core plug installation only.

(7) Place a heat blanket on the layup if heat blanket is used as heat source. The heat blanket must extend a minimum of 2 inches beyond the repair patch edges.

(8) Place on the layup several plies of glass fabric breather cloth for each ply in the repair. The breather cloth must extend beyond the parting film, and also must extend beyond the heat blanket and caul plate (if they are used). The breather cloth must also make contact with the surface bleeder cloth.

(9) Apply extruded sealing compound around the entire area, approximately 2 to 6 inches outside the heating blanket edge.

(10) Secure the vacuum outlet to the surface breather cloth (outside of the repair ply area).

NOTE: Completely enclose the entire packboard in a vacuum bag.

CAUTION: DO NOT ATTACH VACUUM BAG TO ONE SIDE OF COMPONENT ONLY. IF YOU CANNOT COMPLETELY ENCLOSE THE PACKBOARD IN A VACUUM BAG, ATTACH SEPARATE VACUUM BAGS TO EACH SIDE TO ENSURE THAT ATMOSPHERIC PRESSURE IS MAINTAINED INSIDE OF COMPONENT DURING REPAIR (FIG. 615).

(11) Lay a piece of vacuum bag material over the entire repair area, sealing the edge with the extruded sealing compound. Pleat the vacuum bag where needed to prevent bridging of bag material and subsequent bag breakage. Pad all sharp objects and corners to prevent bag breakage.

NOTE: The entire repair surface must be vacuum bagged and restrained in place to prevent delamination and distortion when the repair area exceeds 15 percent of panel area. Regardless of the method of heat application, restraining devices that maintain the contour and support the part must be used.

(12) Evacuate the space under the vacuum bag and maintain a minimum of 22 inches of mercury vacuum.

NOTE: Maintain vacuum of 22 inches of mercury minimum during entire cure cycle.

(13) Check the vacuum bag and ensure that there are no leaks.

G. Cure the Repair

NOTE: Determination of the temperature must be made by using thermocouples placed at edge of patch.

The gel and cure times of the potting and laminating resins are based on ambient temperature (70 to 80°F; 21 to 27°C); elevated temperatures will advance the reactions and lower temperatures will retard the reactions.

An infrared heat lamp (250-watt), heating blankets or equivalent source may be used to accelerate the cure. The graph shown in Fig. 616 indicates the temperature obtained on the patch surface when the heat lamp is a certain height. Monitor temperature by thermocouples.

WARNING: USE EXPLOSIONPROOF HEAT LAMP OR HEAT BLANKETS FOR ACCELERATE CURE. NONCOMPLIANCE COULD CAUSE PERSONNEL INJURY.

CAUTION: SURFACE TEMPERATURE MUST NOT EXCEED 170°F (77°C). DAMAGE OR DISTORTION OF STRUCTURE MAY OCCUR IF TEMPERATURE EXCEEDS 170°F (77°C).

(1) Cure of wet layup.

(a) Cure of the repair may be accomplished at room temperature (70 to 80°F; 21 to 27°C) or can be accelerated by the use of heat. See Fig. 601 and graph in Fig. 616 for time at temperature requirements.

NOTE: Cure time does not include the time required for the mold and part to heat up to temeprature. Cure time is the period after the part has reached that temperature.

(b) Maintain vacuum of 22 inches of mercury minimum during entire cure cycle.

(c) Remove bagging and parting film after curing.

(d) The patch should be free from pits, blisters, starved areas, and excess resin deposits.

H. Refinish After Repair

CAUTION: DO NOT SAND INTO ORIGINAL STRUCTURE. FAILURE TO COMPLY WILL REDUCE THE STRENGTH OF THE COMPONENT.

(1) Lightly sand edge of topmost repair ply as necessary to fair the edge. Sand surface of repair to produce a smooth finish without damaging fibers.

I. Do the Post-Repair Procedures

(1) Do an inspection of the repair to make sure that it is satisfactory. Make sure that there are no empty spaces between plies or defective bonds. The inspection must include the area that was hot plus 2 inches minimum all around.

(2) If you find the repair to be unsatisfactory, you must remove it and install the repair again.

NOTE: The post-repair inspection is recommended. Examples of the inspection procedures are specified in Part 1, 51-01-01, of the applicable NDT manual. Other inspection procedures that have been found to be satisfactory by the airline can be used.

CAUTION: MAKE SURE THAT REPAIRS MADE TO CONTROL SURFACES AND/OR ADJACENT STRUCTURE DO NOT INTERFERE WITH THE DESIGNED OPERATION OF THE CONTROL SURFACES. DAMAGE TO THE AIRPLANES STRUCTURE CAN BE THE RESULT.

4. Typical Packboard Repairs

A. Repair of Delaminations Between Plies

(1) Delamination of plies over core area of panel (Fig. 611).

(a) Determine extent of damage. Ensure that water and other contaminations are removed.

(b) Cut away delaminated plies and prepare damaged area per par. 3.C.

(c) Complete repair per par. 3.E. thru 3.J.

(2) Repair of delaminations between plies of panel edgeband (Fig. 617).

CAUTION: DELAMINATION MUST NOT REACH DEEPER THAN 0.5 INTO PANEL EDGEBAND OR EXTEND TO WITHIN 0.5 OF HONEYCOMB CORE (FIG. 617). IF SO, REPAIR PER DAMAGED PLY METHOD.

(a) Determine extent of damage.

(b) Remove all contaminants and water from damaged area. Area must be completely dried out.

(c) Force Resin Mix 1 (Fig. 601) into delaminated area.

(d) Clamp plies together and remove excess resin.

(e) Cure according to par. 3.G., maintaining pressure until cured. Vacuum pressure is not required for this repair.

(f) Refinish surface as required.

(g) Perform applicable post-repair requirements per par. 3.J. before returning the repaired component to flight service.

B. Repair of Puncture, 0.50-inch Diameter or Less, in Honeycomb Panel (Fig. 612)

(1) Dry out structure around puncture per par. 3.B.

(2) Remove loose fragments and other contamination from the hole. Clean up damaged area to a smooth and rounded shape per par. 3.C.

(3) Clean repair area per par. 3.C.(2)(c).

(4) Prepare Resin Mix 1, or Resin Mix 2, according to Fig. 601.

(5) Work resin into the hole filling as much as possible.

(6) Cure according to par. 3.G.

(7) Carefully sand any projecting material to fair with surrounding surface within ±0.010 inch.

NOTE: A 0.010-inch thick aluminum template may be used to protect surrounding surface while sanding.

(8) Abrade surfaces around repair using No. 240, or finer, Scotch-Brite abrasive.

(9) Clean repair area per par. 3.C.(2)(c).

(10) Prepare and apply two fabric cover plies and complete repair per par. 3.E. thru 3.J.

C. Repair of Damage to One Skin and Honeycomb Core Using Replacement Core Plug, Punctures Greater than 0.50-inch Diameter (Fig. 605).

(1) Determine extent of damage per par. 3.A.

(2) Remove all contamination and water from damaged area per par. 3.B. Area must be completely dried out.

(3) Remove damage and prepare area according to par. 3.C.

(4) Fabricate, clean, and install honeycomb replacement core plug per par. 3.D.

(5) Clean surface according to par. 3.C.(2)(c).

(6) Complete repair per par. 3.E. thru 3.J.

D. Repair of Large Puncture Through Internal and External Surface of Panel Including Core Damage (Fig. 606).

(1) Determine extent of damage per par. 3.A.

(2) Remove all contamination and water from damaged area per par. 3.B. Area must be completely dried out.

(3) Remove damage and prepare area according to par. 3.C.

(4) Cut, clean, and install honeycomb replacement core plug per par. 3.D., except it is not necessary to vacuum bag the core plug installation at this time.

(5) Prepare and apply repair plies to one surface of the panel according to par. 3.E. A caul plate may be used to restrain the core plug in place.

(6) Bag and apply vacuum and cure according to par. 3.F. and 3.G. Ensure that temperature is approximately equal on both sides of panel.

(7) Sand core plug flush with surrounding material.

(8) Prepare and apply repair plies to the other surface of the panel and complete repair per par. 3.E. thru 3.J.

NOTE: The above two-stage cure procedure is recommended. As an option, a three-stage cure procedure may be used wherein the core plug installation and the repair plies on each side may be cured separately.

E. 150°F (66°C) Cure Wet Layup Repair of Damaged Panel Attach Holes in Honeycomb Panel Edgebands or Along Edges of Laminated Panels (Fig. 610)

(1) Determine the extent of damage per par. 3.A.

(2) Remove all contamination and water from damaged area per par. 3.B. Area must be completely dried out. Any structure in the repair area that cannot be dried out must be removed along with the other damage.

(3) Taper sand around the hole to remove damage according to Fig. 610.

(4) Clean area according to par. 3.C.(2)(c).

CAUTION: ON HYBRID PANELS, ENSURE THAT GRAPHITE REPAIR PLIES DO NOT EXTEND INTO AREAS OF FASTENER HOLES. ELECTROLYSIS BETWEEN METAL FASTENERS, SUPPORT STRUCTURE AND GRAPHITE MAY OCCUR CAUSING CORROSION TO ALUMINUM STRUCTURE.

(5) Complete the repair as given in Fig. 610 and as given in par. 3.E. thru 3.H., but cure only at 150°F (66°C).

(6) Drill and countersink fastener holes. Refer to SRM 51-70-16 for drilling in composites.

F. Repair of Surface Dents (Fig. 613)

(1) Check for delamination and broken fibers per par. 3.A.

(2) If delamination is found, repair per par. 4.A.

(3) If broken fibers are found, repair per par. 4.B. or 4.C.

(4) If no delamination or broken fibers are found, mark off damaged area allowing 1.0 inch of overlap for the repair ply.

(5) Clean damaged area according to par. 3.C.(2)(c).

(6) Mask area for repair with masking tape.

(7) Pot dent flush or slightly higher than surrounding surface with Resin Mix 2 potting compound.

(8) Cure per par. 3.G.

CAUTION: DO NOT SAND INTO FIBERS IN THE AREA SURROUNDING DENT.

(9) Sand flush using 150 grit or finer sandpaper.

(10) Clean area according to par. 3.C.(2)(c).

(11) Prepare and apply one ply layer of Type H-2 or H-3 glass fabric according to par. 3.E. The ply layer is to be 2.0 inches larger than the potted area (Fig. 613).

(12) Complete repair per par. 3.F. thru 3.H.

G. Repair of Resin Crack in One Skin (Fig. 614)

(1) Determine the extent of damage per par. 3.A.

(2) Repair as shown in par. 4.C.

| RESIN, PREPREG, OR ADHESIVE TYPE | COMPONENTS | PARTS BY WEIGHT | OPEN TIME BEFORE USE, OR POT LIFE OF MIXTURE | CURE TIME 1 |
|---|---|---|---|---|
| RESIN MIX 1<br>(LAMINATING RESIN)<br>(BMS 8-301,<br>CLASS 2) | FR 7020<br>RESIN - PART A<br>HARDENER - PART B<br>EY 3804<br>RESIN - PART A<br>HARDENER - PART B | <br>100 ±2<br>58 ±0.5<br><br>100<br>66 | APPROX 30 MINUTES AT 75°F (24°C) | 30 MINUTES AT 150°F (66°C)<br>6 HOURS MIN AT ROOM TEMPERATURE 65°F MIN (19°C)<br>CURE FOR 180 MINUTES AT 150°F (66°C) |
| RESIN MIX 2<br>(POTTING RESIN)<br>(BMS 5-28, TYPE 7) | CG-1305 RESIN<br>CG-1305 HARDENER | 100<br>22 | 60 MINUTES AT 70°F (21°C) | 12 HRS AT 65°F MIN (19°C)<br>2 HRS AT 125°F (52°C) 2 |
| | FR 7162 RESIN<br>FR 7162 HARDENER | 100 ±5<br>40 ±2 | | |
| RESIN MIX 3<br>(POTTING RESIN) | RESIN MIX 2<br>MICROBALLOONS | 100<br>5 | SAME AS RESIN MIX 2 | SAME AS RESIN MIX 2 |

WARNING: THESE CHEMICALS CONTAIN TOXIC INGREDIENTS. PROVIDE ADEQUATE VENTILATION AND PROTECT THE SKIN AND EYES FROM CONTACT WITH UNCURED RESINS OR CURING AGENT. WEAR RUBBER GLOVES OVER COTTON GLOVES FOR PROTECTION OF HANDS. IF SKIN IS EXPOSED TO DIRECT CONTACT WITH UNCURED RESINS OR CURING AGENT, WASH WITH WARM WATER OR SOAP. AVOID THE USE OF SOLVENTS FOR CLEANING THE SKIN.

CAUTION: TO PREVENT CONTAMINATION OF THE RESIN, DO NOT USE WAXED CONTAINERS FOR MIXING.

| | MIXING PROCEDURE |
|---|---|
| RESIN MIX 1<br>RESIN MIX 2 | ADD HARDENER TO RESIN AND MIX THOROUGHLY. |
| RESIN MIX 3 | 1. ADD PHENOLIC MICROBALLOONS TO RESIN AND MIX THOROUGHLY.<br>2. ADD HARDENER AND MIX THOROUGHLY. |

NOTE: MATERIALS MUST GEL AT ROOM TEMPERATURE PRIOR TO HEATING. RATE OF HEAT RISE MUST BE NO GREATER THAN 7°F (4°C) PER MINUTE.

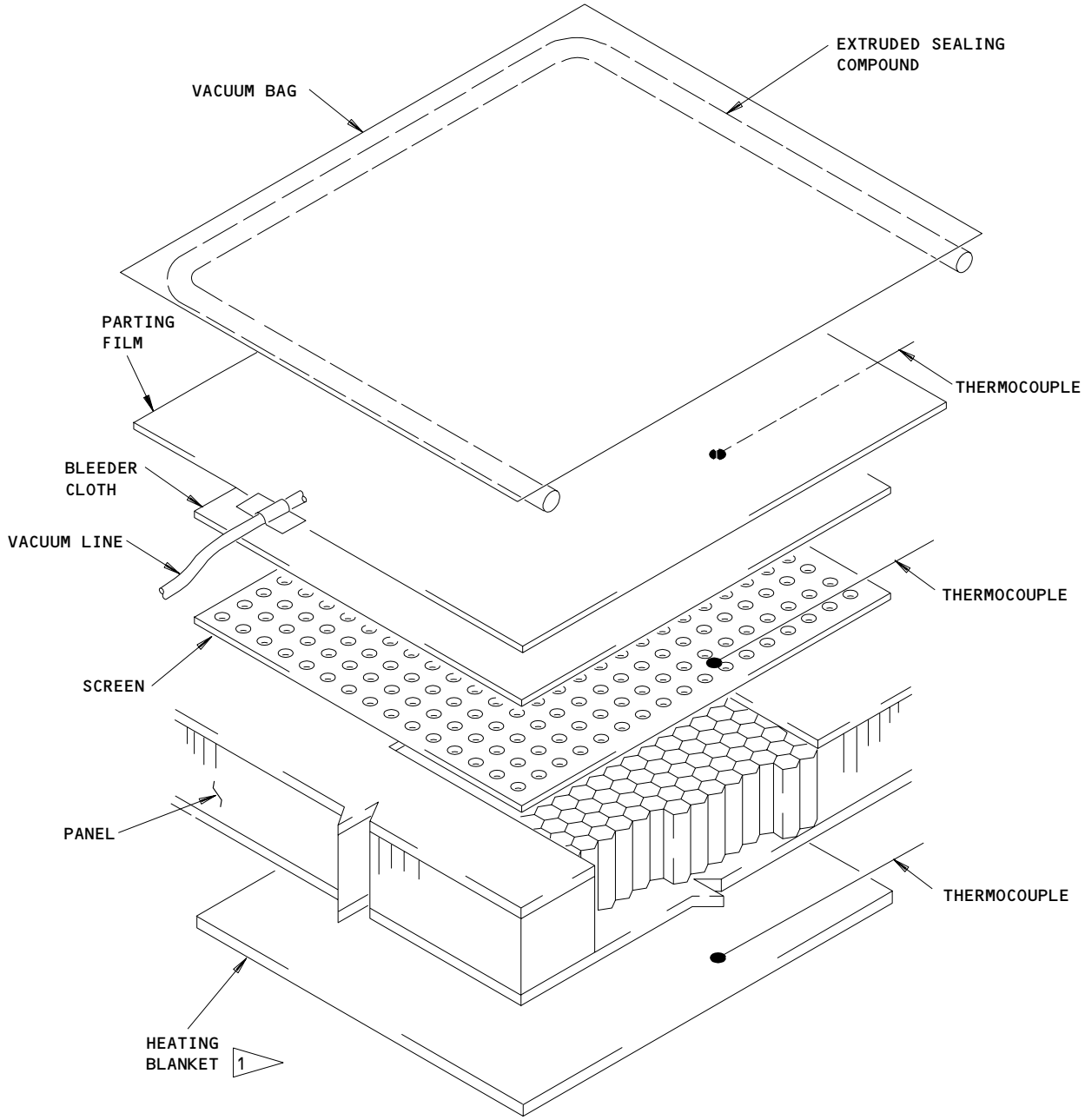
REFER TO SRM 51-30-03 FOR SOURCES OF MATERIALS.

1 UNLESS SPECIFIED DIFFERENTLY, CURE TIME IS THE MINIMUM TIME NECESSARY TO CURE PRIOR TO HANDLING, DRILLING, OR SANDING

2 FOR OPTIMUM PROPERTIES, CURE 7 DAYS AT 65°F (19°C) OR 5 HOURS AT 125°F (52°C)

Resin Specifications and Mixing Procedure
Figure 601

K50681

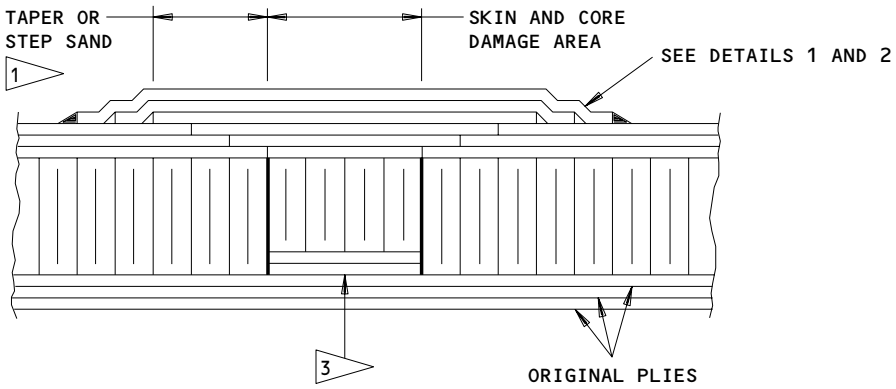



1 THE PREFERRED LOCATION OF THE HEATING BLANKET IS OPPOSITE THE OPEN CELLS IN THE CORE

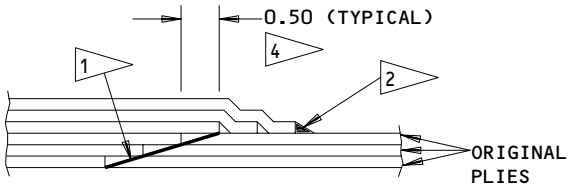
Water Removal From Honeycomb Sandwich
Figure 602



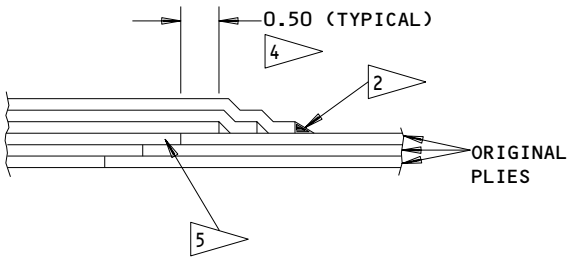
K50935




SECTION THROUGH TYPICAL REPAIR
(WET LAYUP ONLY)




TAPER SANDED SKIN
DETAIL 1



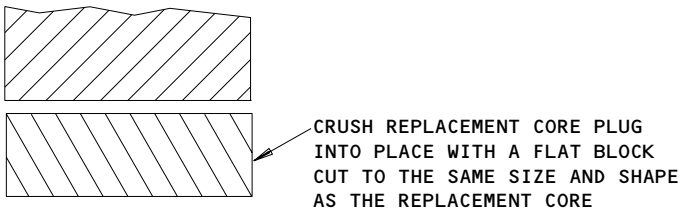

STEP SANDED SKIN
DETAIL 2

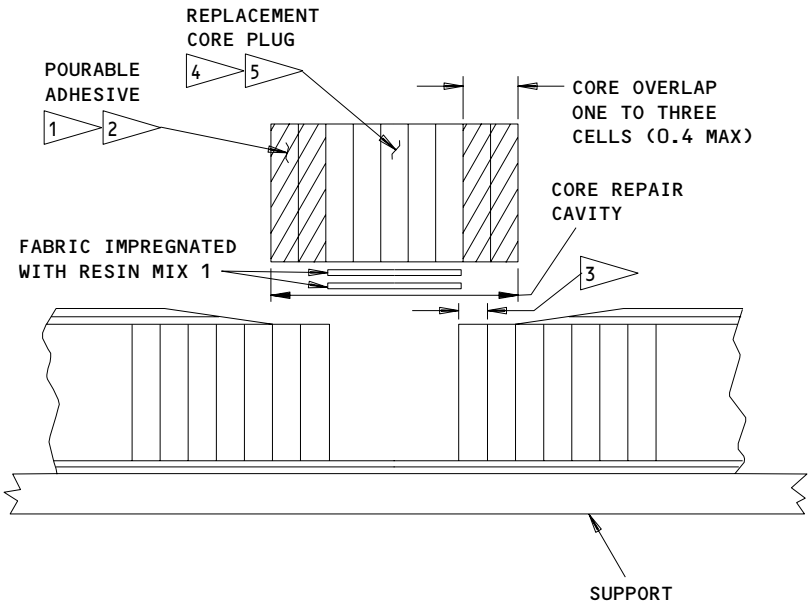
1. TAPER SAND OR STEP SAND EXISTING PLIES AROUND REPAIR AREA A MINIMUM OF 0.50 INCH FOR EACH EXISTING PLY
2. DO NOT EXPOSE OR DAMAGE FILAMENTS IN UNTAPERED AREA WHEN SANDING
3. SANDING MUST NOT EXPOSE OR DAMAGE THE FILAMENTS IN BOND PLY (PLY BONDED TO CORE)
4. EACH PLY MUST OVERLAP AT LEAST 0.50 INCH PAST EDGE OF PRECEDING PLY
5. REMOVE DAMAGED PLIES IN STEPS

Sanding and Overlap Requirements
Figure 603



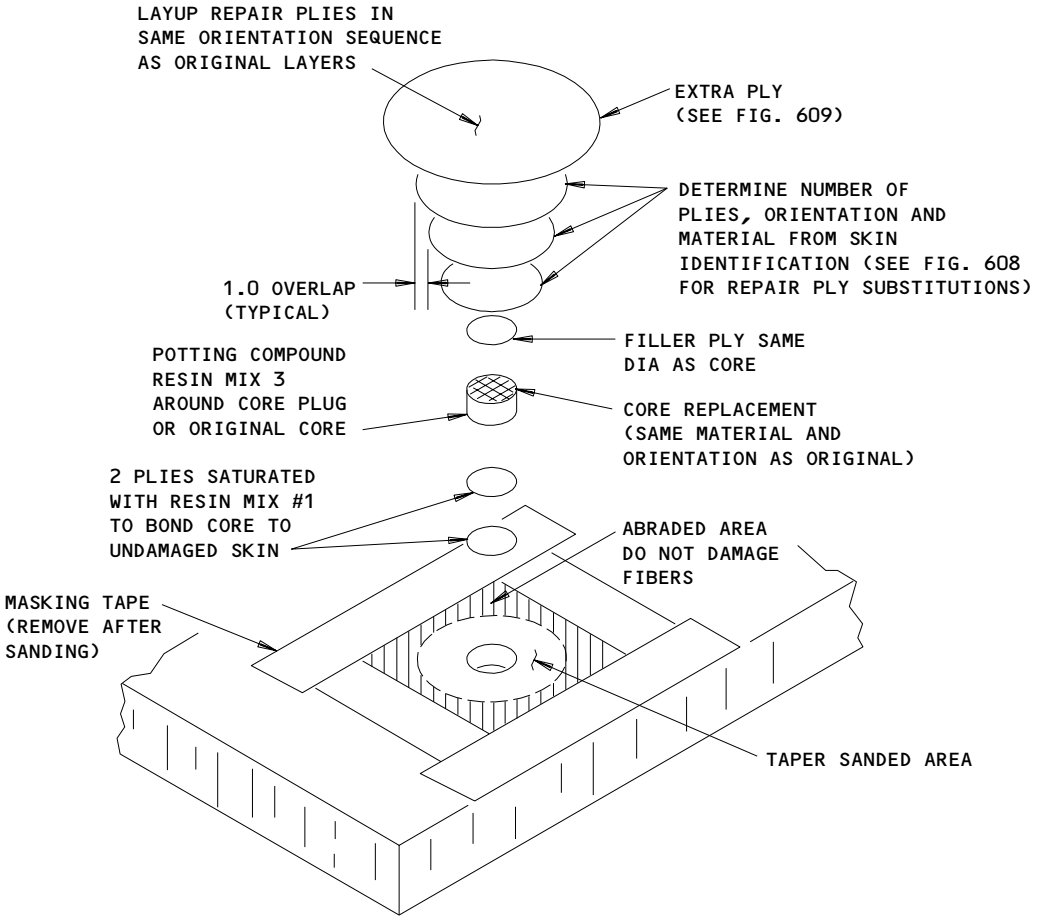
K51256




1. BEFORE SPLICING, DIP PERIPHERY OF CORE PLUG INTO RESIN MIX 3 TO A DEPTH OF ONE TO THREE CELLS (0.4 INCH MAX)
2. AFTER SPLICING, POUR ADDITIONAL ADHESIVE INTO SPLICED CELLS
3. WHEN PREPARING REPAIR AREA LEAVE ONE TO THREE CELLS (0.4 INCH MAX) VISIBLE BETWEEN CORE REPAIR CAVITY AND SKIN TO MATCH CORE OVERLAP
4. ALIGN HONECOMB CELLS OF REPAIR PLUG WITH ORIGINAL CORE
5. REPLACEMENT CORE PLUG MUST BE MADE FROM CORE MATERIAL AT LEAST TWO GRADES DENSER THAN THE ORIGINAL CORE

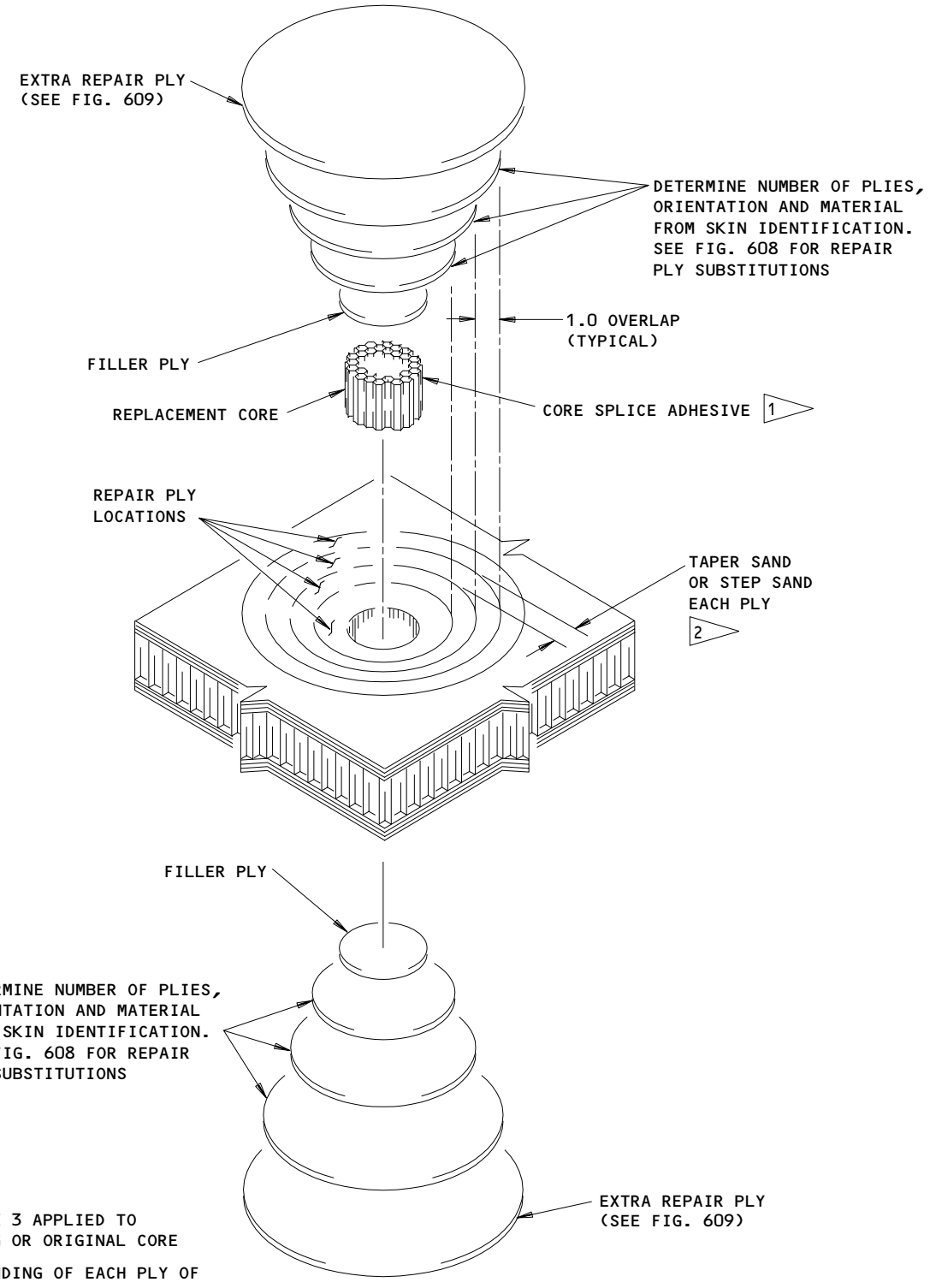
Core Crush Splicing Requirements – Wet Layup
Figure 604




Repair of Large Punctures Thru One Skin of a Sandwich Structure Including Core Damage – Wet Layup
Figure 605



K50684




1 RESIN MIX 3 APPLIED TO CORE PLUG OR ORIGINAL CORE

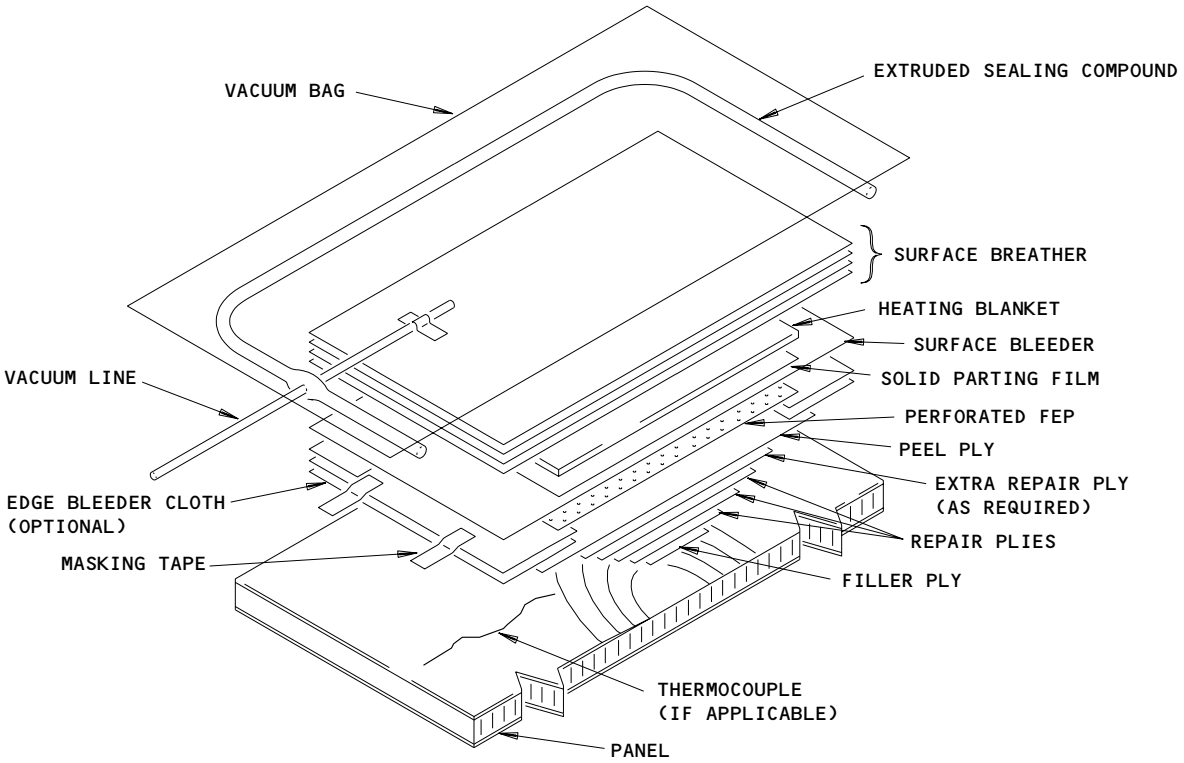
2 TAPER SANDING OF EACH PLY OF EXTERNAL SKIN IS RECOMMENDED. STEP SANDING OF EACH PLY IS OPTIONAL

WET LAYUP ONLY

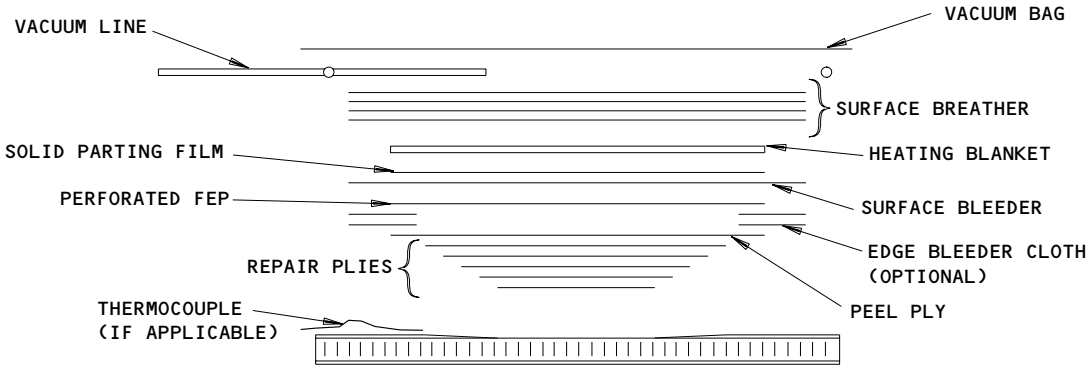
Repair of Large Punctures Through Both Skins of a Sandwich Panel Including Core Damage – Wet Layup
Figure 606



K50696



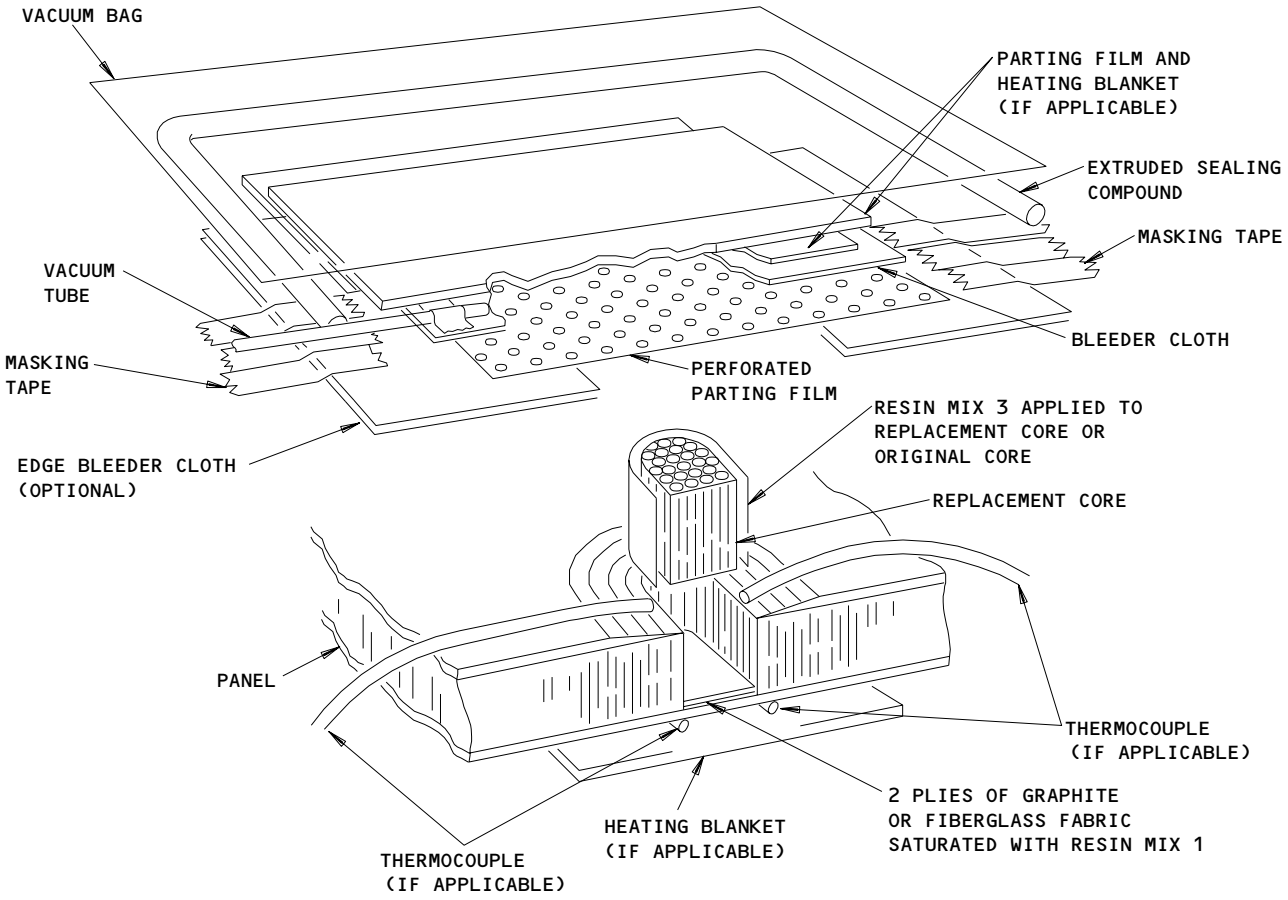

CUTAWAY VIEW OF
BAGGING SEQUENCE FOR SKIN PLY REPAIR
(WET LAYUP)



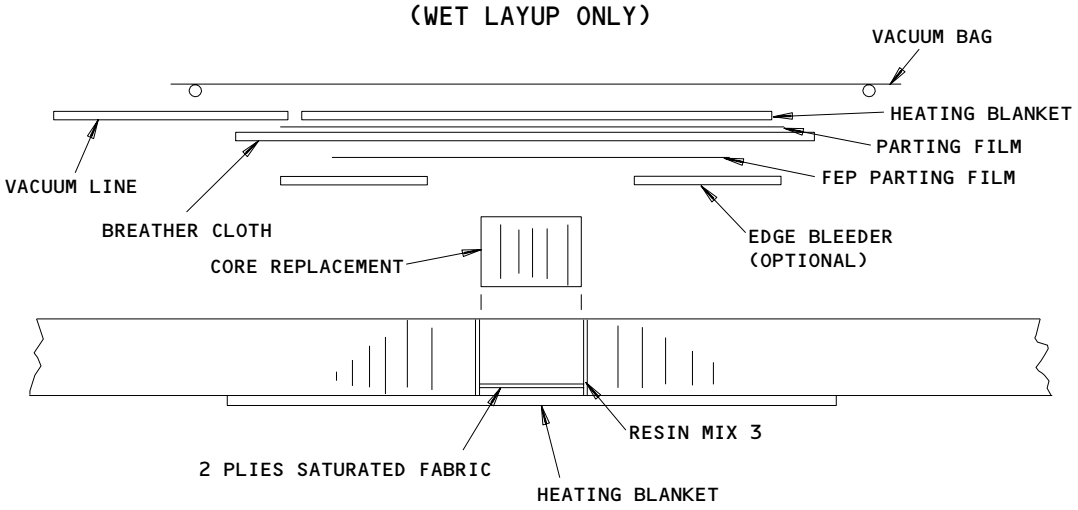

SECTION THRU LAYUP FOR SKIN PLY REPAIR
(WET LAYUP)

Application of Pressure During Cure - Wet Layup
Figure 607 (Sheet 1)

K50685




BAGGING SEQUENCE FOR CORE REPLACEMENT
(WET LAYUP ONLY)




SECTION THRU LAYUP FOR CORE REPLACEMENT
(WET LAYUP ONLY)

Application of Pressure During Cure – Wet Layup
Figure 607 (Sheet 2)



K50686

| ORIGINAL PLY MATERIAL | | REPAIR PLY MATERIAL | REPAIR PLY SUBSTITUTE MATERIAL |
|---|---|---|---|
| GLASS FABRIC | BMS 8-79, STYLE 1543 | BMS 9-3, TYPE F-2<br>BMS 9-3, TYPE H-2 1<br>BMS 9-3, TYPE H-3 | NONE |
| | STYLE 1581 | | |
| | STYLE 7781 | | |
| | BMS 8-151, TYPE III | BMS 9-3, TYPE H-2 OR H-S 1 | NONE |
| ARAMID FABRIC | BMS 8-219, STYLE 285 | BMS 9-3, TYPE H-2 OR H-3 (GLASS FABRIC) 1 | BMS 9-3, TYPE D 2 |
| GRAPHITE TAPE | BMS 8-168, TYPE II, CLASS 1, ALL GRADES | BMS 9-8, TYPE I, CLASS 2. STYLE 3K-70-P (GRAPHITE FABRIC) 3 | NONE |
| | BMS 8-212, TYPE III, CLASS 1, ALL GRADES | | |
| GRAPHITE FABRIC | BMS 8-168, TYPE II, CLASS 2, STYLE 3K-70-PW | BMS 9-8, TYPE I, CLASS 2, STYLE 3K-70-P | 2 PLIES BMS 9-3, TYPE H-2 OR H-3 |

1 BMS 9-3, CLASSES 2, 5 THRU 13, 16 THRU 19 CAN BE USED. CLASS 7 IS RECOMMENDED BECAUSE IT IS KNOWN TO HAVE GOOD STORAGE LIFE

2 USE TWO PLIES OF TYPE D IN PLACE OF ONE PLY OF TYPE H-2 OR H-3

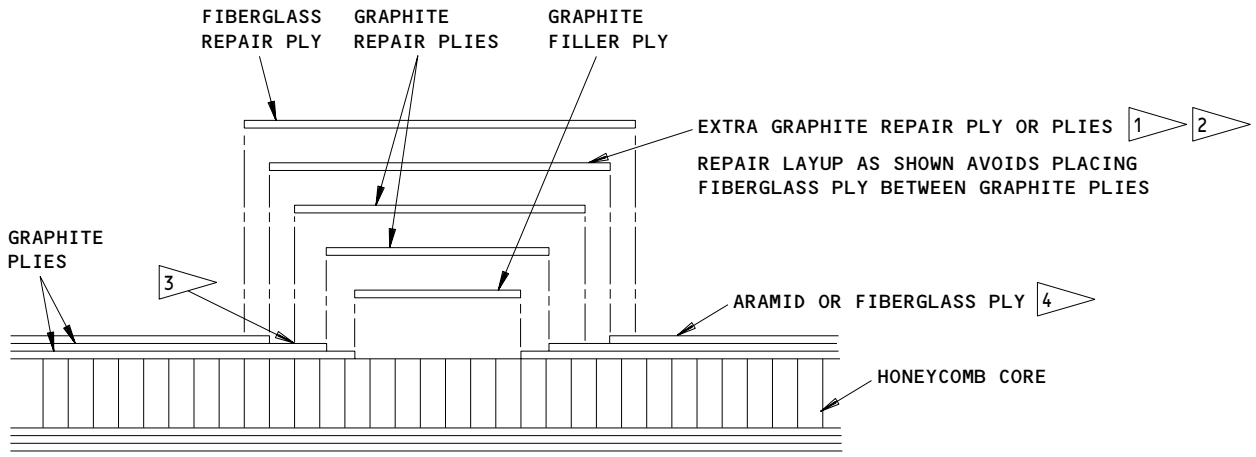
3 USE TWO REPAIR PLIES, AT THE ORIGINAL PLY ANGLE, TO REPLACE EACH PLY OF ORIGINAL MATERIAL

Repair Ply Materials
Figure 608



K51250

| COMPONENT MATERIAL | EXTRA PLY MATERIAL ▷2 |
|---|---|
| GRAPHITE FABRIC | GRAPHITE FABRIC, STYLE 3K-70-P |
| GRAPHITE/ARAMID/GLASS | GRAPHITE FABRIC, STYLE 3K-70-P ▷1 |
| ARAMID | GLASS FABRIC, TYPE H-2 OR H-3 |
| GLASS FABRIC | GLASS FABRIC, TYPE H-2 OR H-3 |




SECTION THRU HONEYCOMB SANDWICH
DETAIL 1

▷1 ON HYBRID PANELS, GRAPHITE EXTRA PLIES MUST BE BONDED TO GRAPHITE PLY. SEE DETAIL 1

▷2 THE ORIENTATIONS OF THE EXTRA REPAIR PLIES MUST REPEAT THE ORIENTATIONS OF THE EXISTING PLIES IN THE ORIGINAL LAMINATE STARTING WITH THE OUTERMOST PLY

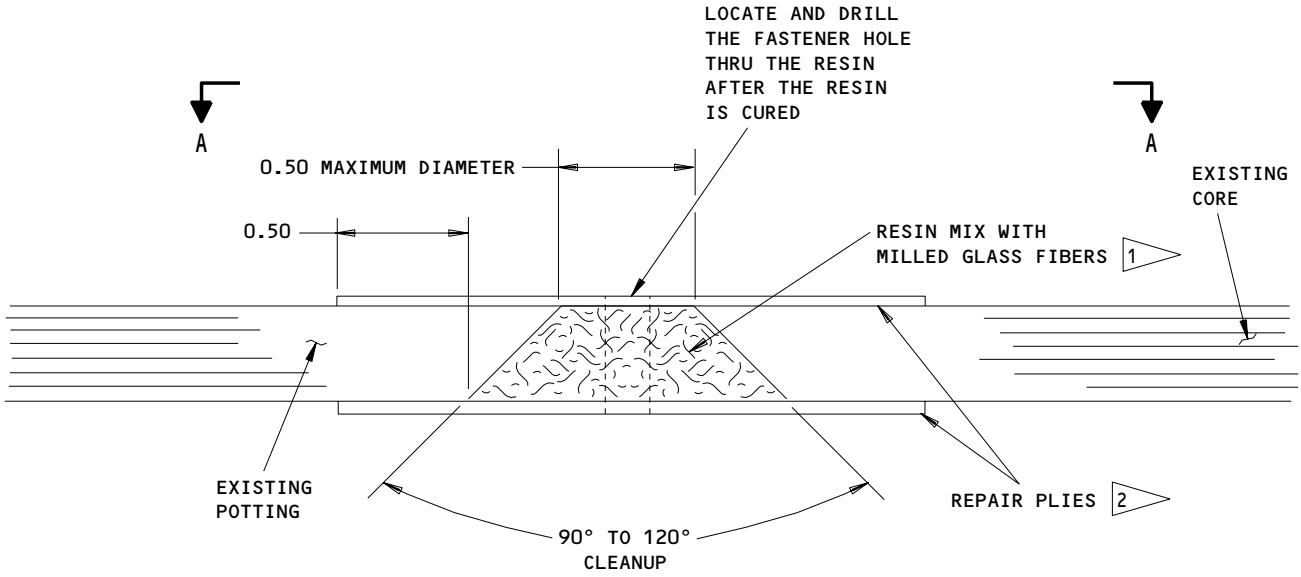
▷3 WHEN EXTRA GRAPHITE REPAIR PLY OR PLIES ARE REQUIRED, THE EXISTING OUTER PLY OF FIBERGLASS MUST BE SANDED TO ALLOW AN OVERLAP OF 1.00 FOR EACH EXTRA REPAIR PLY.

▷4 CONDUCTIVE COATING, REFER TO SRM 51-70-04, SRM 51-70-05, OR SRM 51-70-14 AS APPLICABLE FOR REPAIR OF THE CONDUCTIVE COATING

Extra Repair Ply Materials
Figure 609



K51267



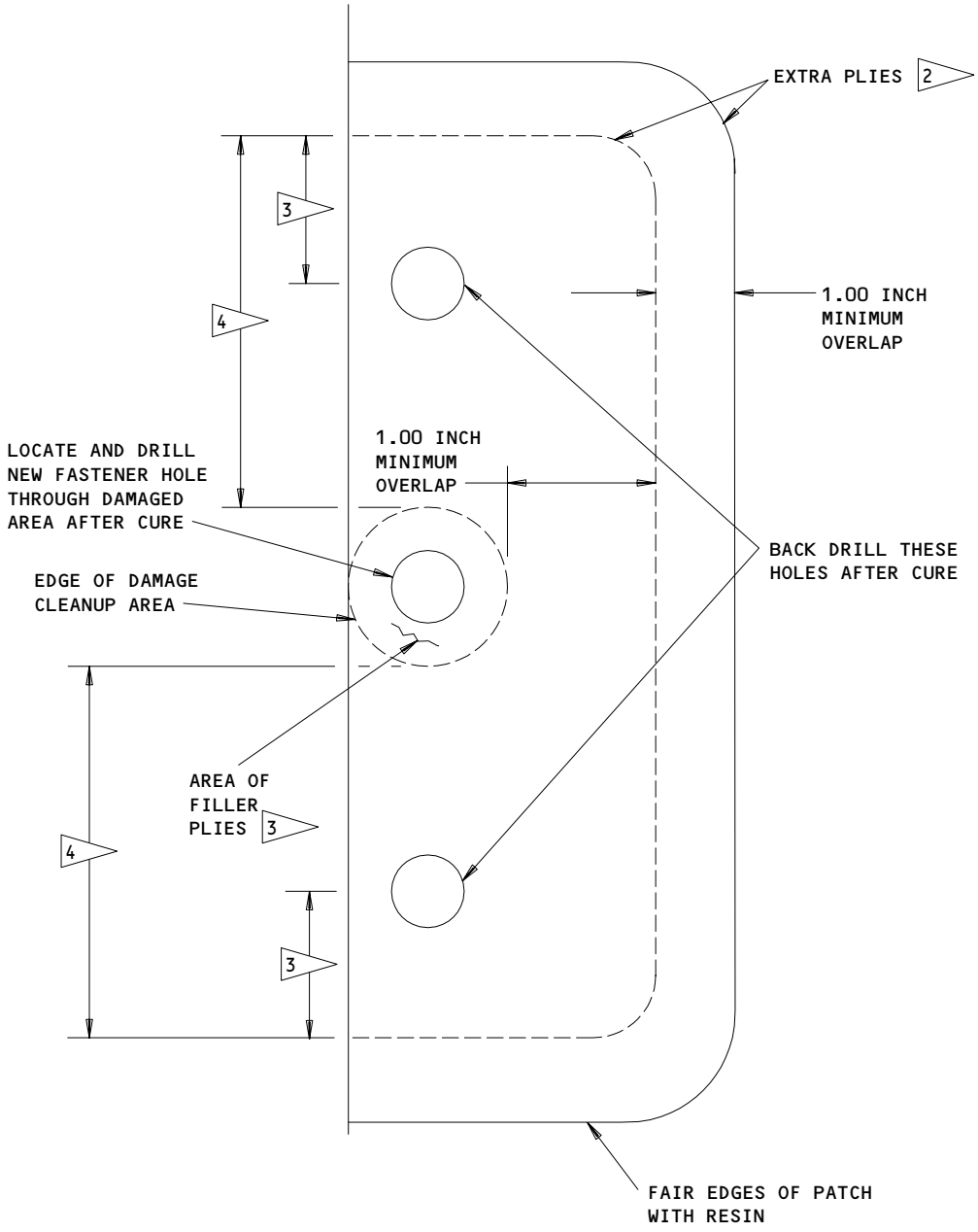

DETAIL I

1. USE RESIN MIX 1 WITH 42% MILLED GLASS FIBERS ADDED OR BMS 5-28, TYPE 6 (REFER TO RESIN MIX 3, FIGURE 601)
2. ALIGN THE REPAIR PLIES IN THE SAME DIRECTION AS THE ORIGINAL OUTER LAYER
3. INSTLL AN EXTRA REPAIR PLY TO EXTEND AT LEAST 2D (D = HOLE DIAMETER) BEYOND EACH EDGE OF THE REPAIRED HOLE
4. INSTALL AN EXTRA REPAIR PLY TO EXTEND AT LEAST 1 INCH BEYOND THE EDGE OF THE REPAIRED AREA

Repair of Damaged Panel Attach Hole - 150 Degrees Fahrenheit
(66 Degrees Celsius) Cure Wet Layup
Figure 610 (Sheet 1)



K50725

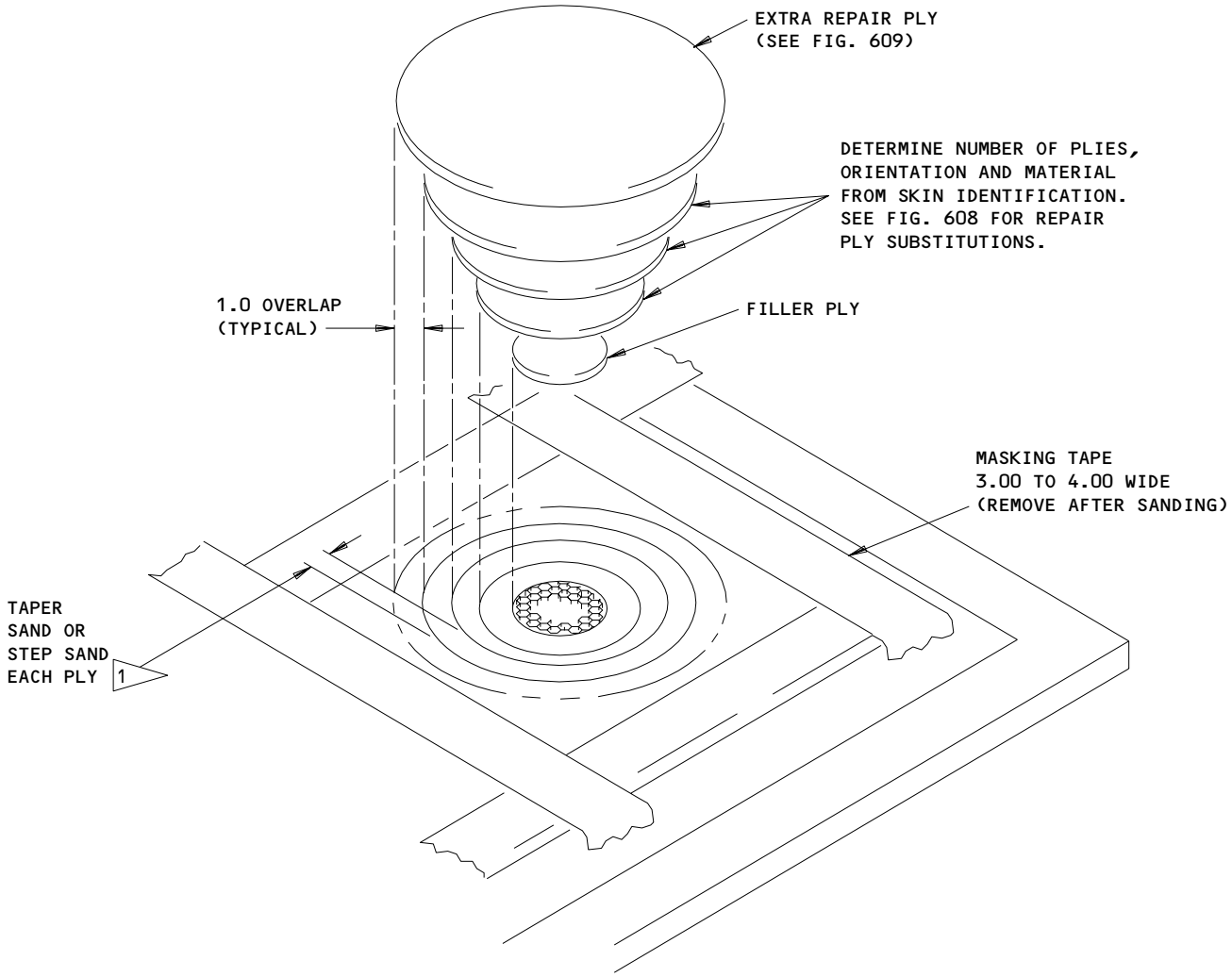



A-A

Repair of Damaged Panel Attach Hole - 150 Degrees Fahrenheit
(66 Degrees Celsius) Cure Wet Layup
Figure 610 (Sheet 2)



K50864



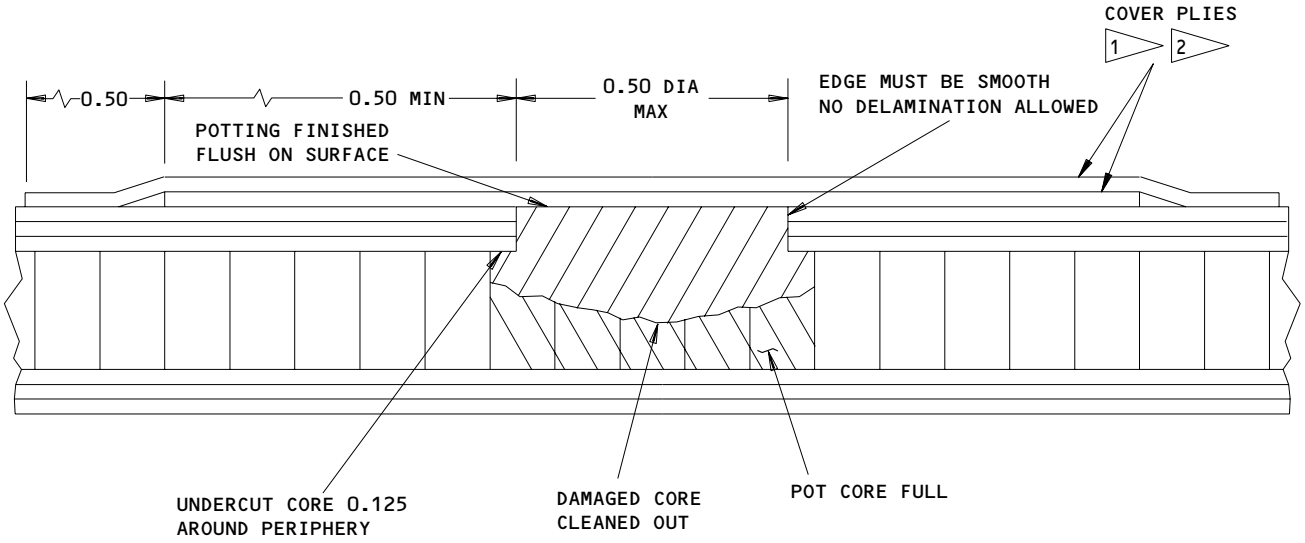

WET LAYUP ONLY

1 TAPER SANDING OF EACH PLY OF EXTERNAL SKIN IS RECOMMENDED. STEP SANDING OF EACH PLY OF INTERNAL SKIN IS OPTIONAL

Repair of Damaged Skins of a Sandwich Panel – Wet Layup
Figure 611



K50693




TYPICAL SECTION

NOTE: OVERLAP COVER PLIES PER FIG. 603.
DO NOT TAPER SAND OR STEP SAND ANY PLIES.

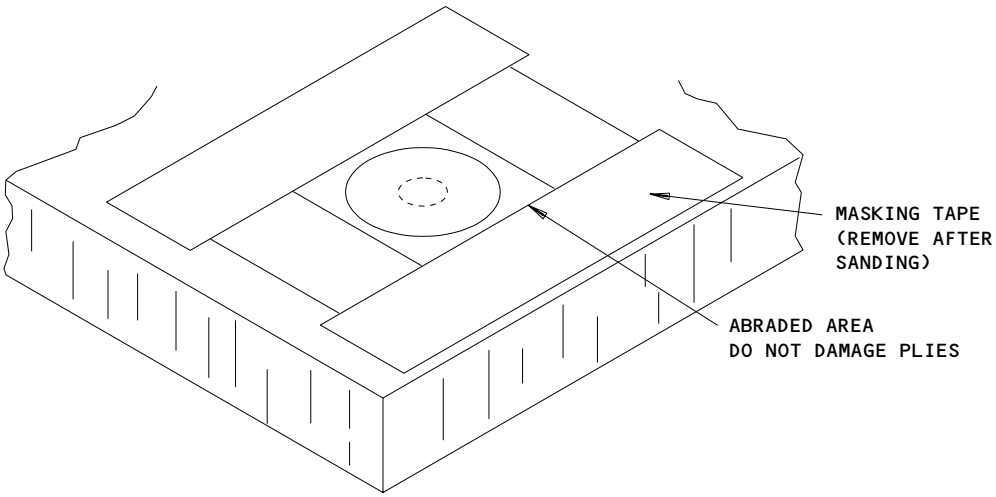
1 ORIENT COVER PLIES IN THE SAME DIRECTION AS THE ORIGINAL OUTER LAYER

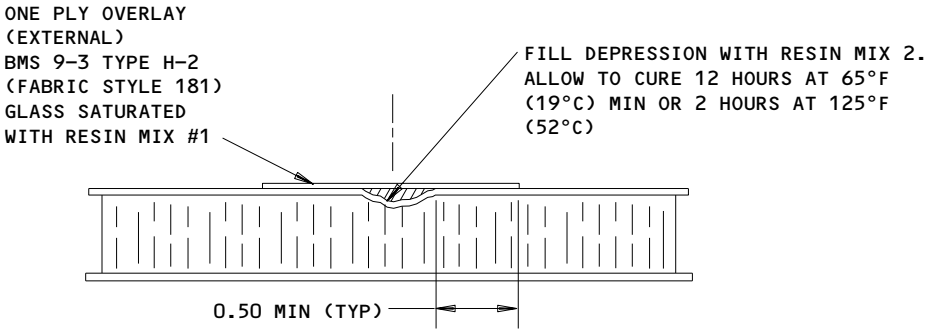
2 PREPARE AND APPLY TWO GLASS FABRIC COVER PLIES PER PAR. 3.E, EXCEPT USE TYPE H-2 OR H-3 PLIES ONLY

Typical Puncture Repair, 0.50 - Inch Diameter or Less - Wet Layup
Figure 612



K51259

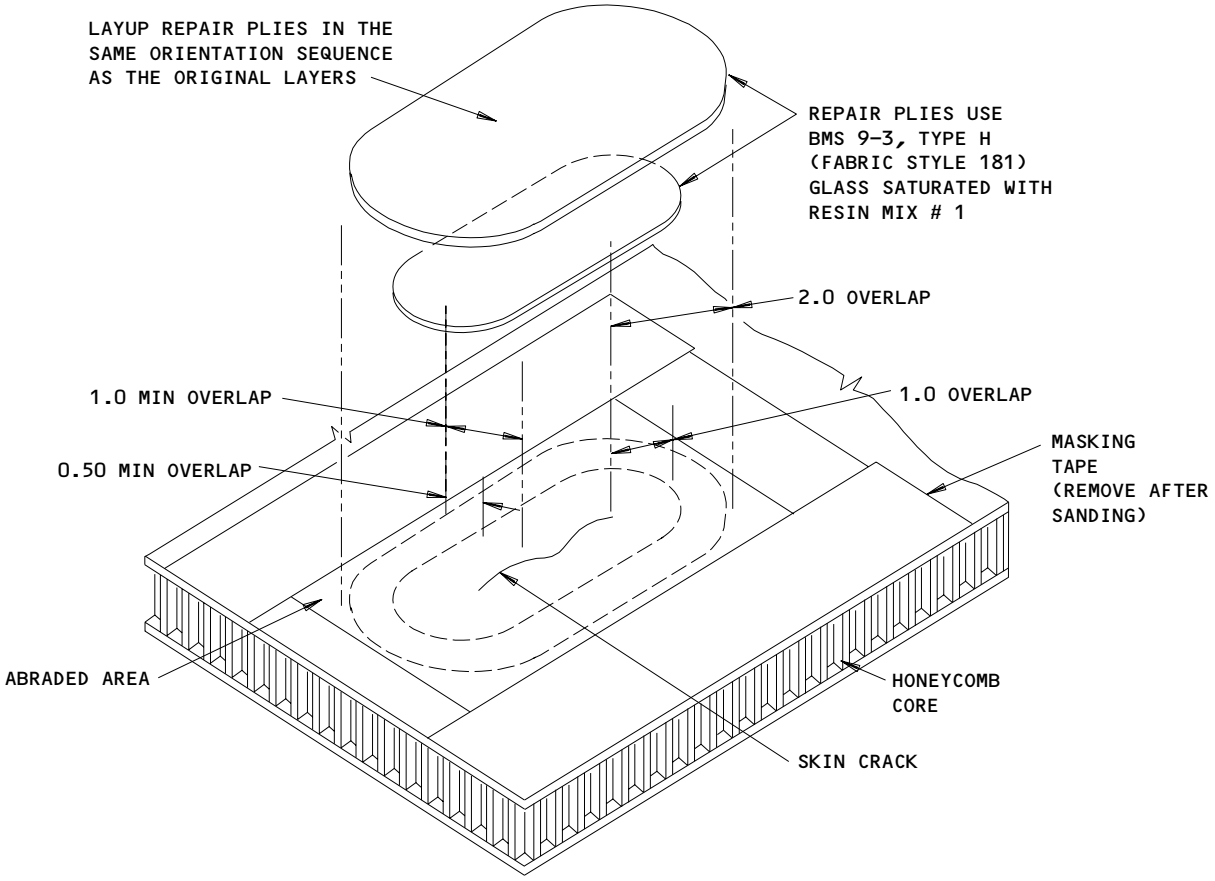



Typical Repair for Dents - Wet Layup
Figure 613



K51260

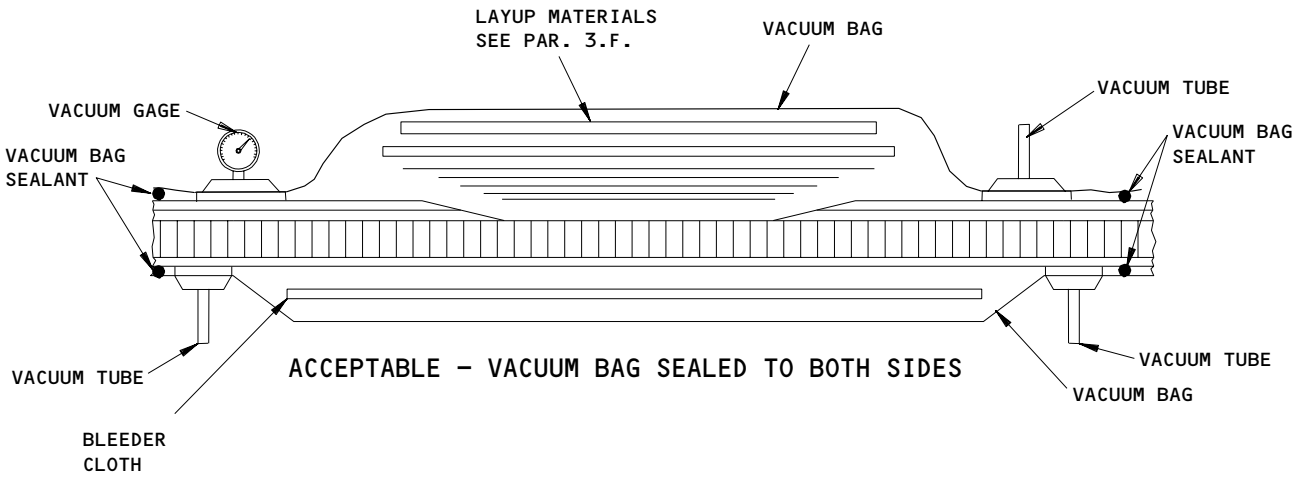



SECTION VIEW

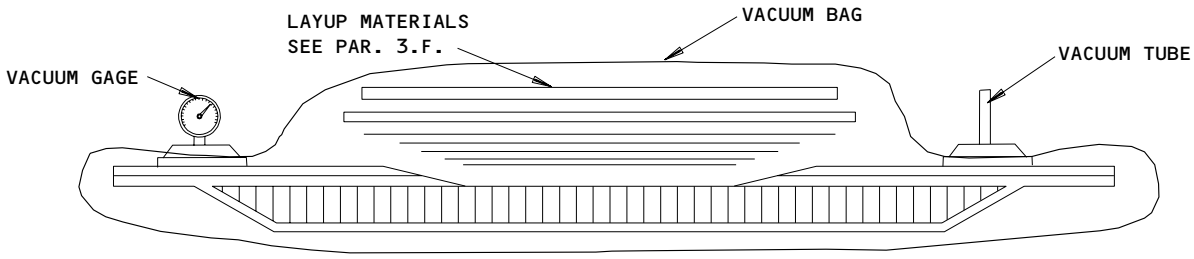
Repair of Small Damage to One Skin
Figure 614



K51268




ACCEPTABLE – VACUUM BAG SEALED TO BOTH SIDES



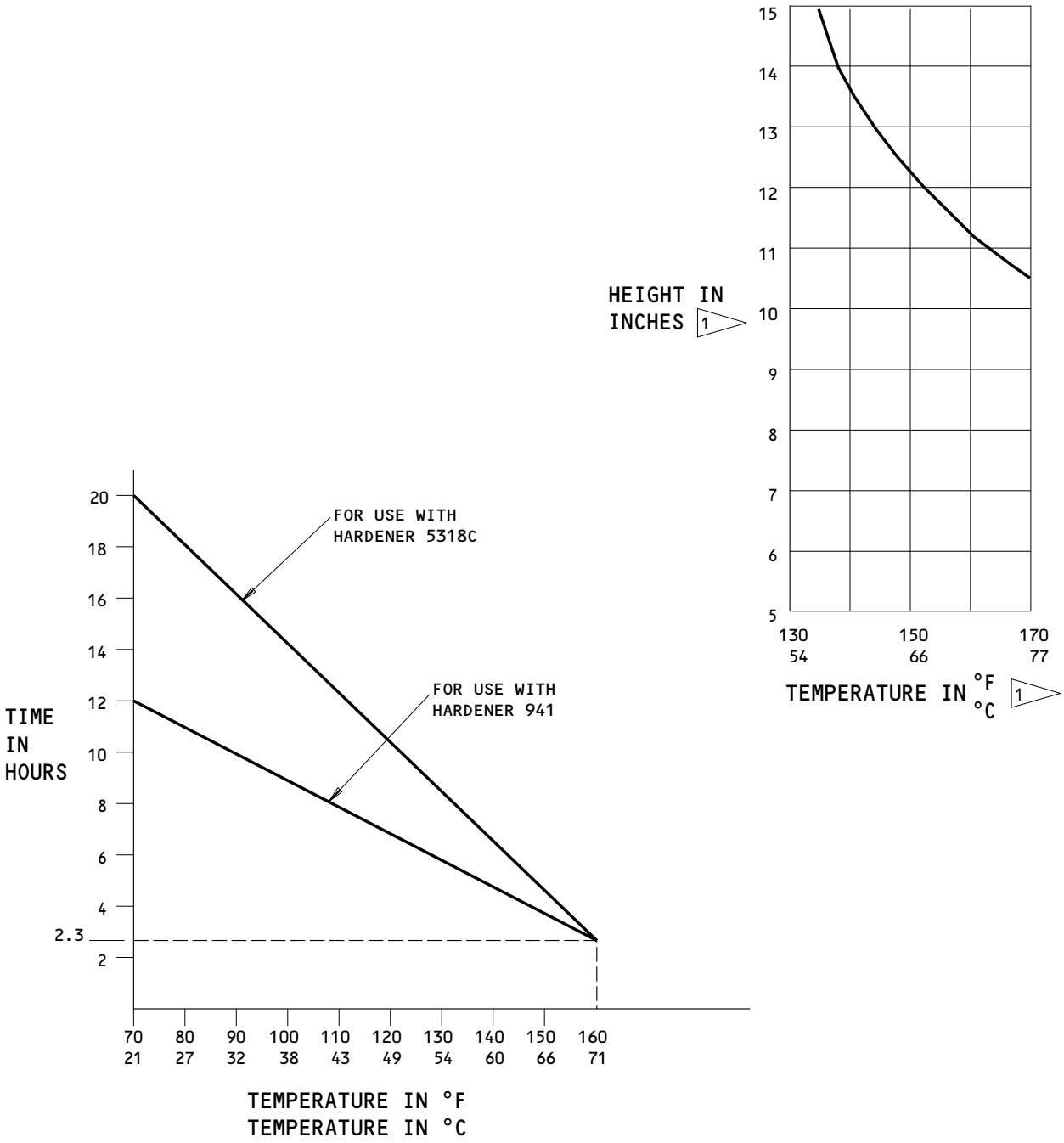

ACCEPTABLE – VACUUM BAG SEALED AROUND ENTIRE PART

NOTE: REFER TO PAR. 3.F FOR LAYUP AND BAGGING PROCEDURES.

Vacuum Bagging Restrictions
Figure 615



K51272



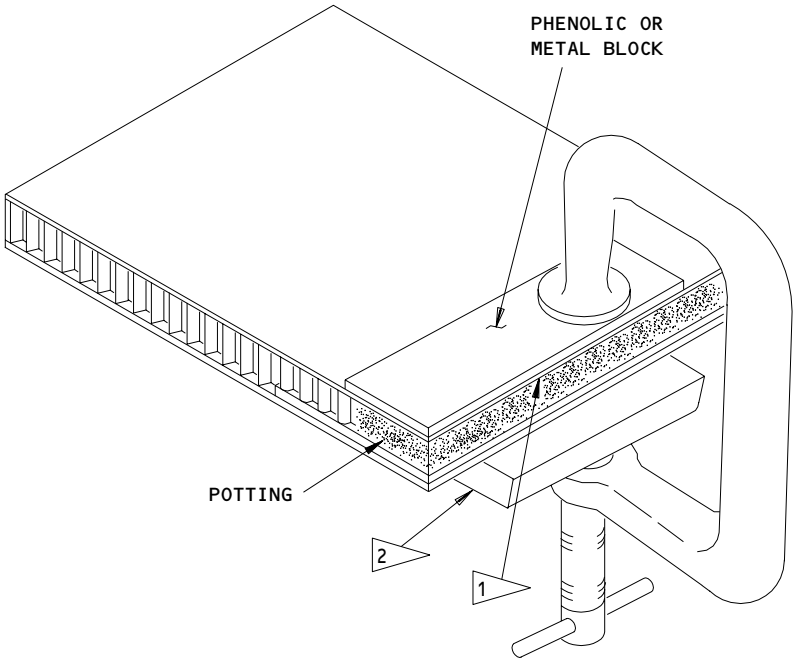

NOTE: USE THERMOCOUPLES TO MONITOR TEMPERATURE.

1 THE HEIGHT IN INCHES OF 250 WATT HEAT LAMP FROM THE SURFACES OF THE PATCH VS TEMPERATURE AT SURFACE OF PART

Potting and Laminating Resin Cure Temperature
Figure 616



K50692




NOTE: REFER TO PARAGRAPH 4.A.(2) FOR THE COMPLETE REPAIR INSTRUCTIONS.

1 FORCE RESIN MIX 1 INTO DELAMINATED AREA

2 CLAMP PLIES TOGETHER AND CURE

Repair of Delaminations Between Plies of Panel Edgeband
Figure 617



K51139