Chapter 51

STANDARD PRACTICES AND STRUCTURES

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51 STANDARD PRACTICES AND STRUCTURES

51-00 GENERAL

1. Scope

On all the models the primary structure is fabricated from aluminum and steel alloys. In particular, the wing, aft fuselage, and empennage are semi-monoque aluminum structures while the forward fuselage is a welded steel tube space frame.

All the models employ a limited amount of composite material construction for secondary structures such as wing tips, landing gear fairings, tail cone, etc. The composite parts are either glass fiber reinforced plastic (GFRP) or carbon fiber reinforced plastic (CFRP). Figures 51-00-01 A through C show the location of the composite components on the various models.

Any repair to the aircraft must be accomplished in accordance with governing aviation regulations.

2. Types of Composite Structures

A. Glass Fiber Reinforced Plastic (GFRP)

GFRP is very thin glass fibers bonded together by resin. The glass fibers give most of the strength and the resin maintains the shape.
The glass fibers are woven to make glass cloth. The orientation and weave of the glass in the cloth affects the structural strength of the cloth. A component can have many layers of cloth bonded together with resin. This is called lamination.
GFRP has very good properties. It is strong and flexible. It is very resistant to chemical attack and very little maintenance is necessary.

B. Carbon Fiber Reinforced Plastic (CFRP)

CFRP is very thin carbon fibers bonded together by resin. The carbon gives most of the strength and the resin maintains the shape.
CFRP is very similar to GFRP. The main advantage of CFRP is that it is lighter and more rigid/stiffer than GFRP.

All composite parts are either laminated and/or sandwich components. A laminated component has 2 or more layers of glass/carbon cloth. The direction of the fibers in the cloth gives the properties for each layer. Extra layers are bonded to critical areas to give more strength. A sandwich component is made of 2 skins and a core. GFRP or CFRP make the skins and plastic foam makes the core. The skins must bond to the core of a

sandwich structure completely. If the skins do not bond to the core, premature failure can occur.

3. Lightning Strike Protection

Composite components on 2C3 and 2C4 utilize lightening strike protection in form of expanded metal foil (EMF). The foil is the external layer in the laminate and it can be repaired. See Figure 51-00-02A & B for location of the EMF on the aircraft.

4. Fire Protection

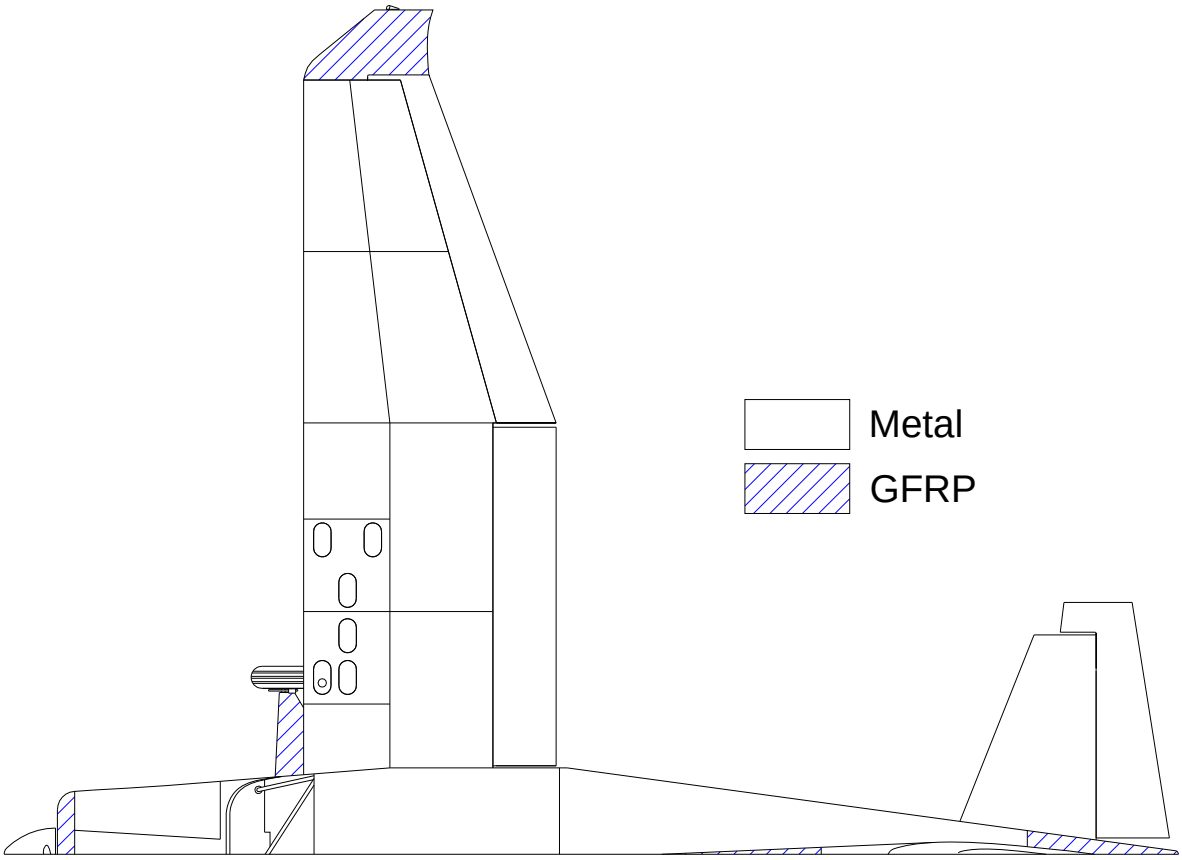
Certain composite components on 2C3 and 2C4 are painted with a fire retardant (intumescent) paint for fire protection. When the paint is exposed to flame, it puffs up to form a very dense, insulating, spongy foam crust, which retards heat penetration to the underlying surface. In particular, the entire inside surface of the cowl structure is painted with intumescent paint.
The intumescent paint must be restored in case of a repair to a composite part.
See Figure 51-00-03 for location of the intumescent paint.

5. Electrical Bonding

The composite components on 2C3 and 2C4 are electrically bonded to the fire wall and steel tube forward fuselage through direct contact or through metal fasteners. These areas are called designated electrical bonding areas, or DEBA.
See Figure 51-00-04 for locations throughout the aircraft.
Contact FAC for a repair scheme required in the designated electrical bonding areas.

6. Repair Limitations

In general, all composite components are field repairable. However, depending on the extent of damage or shape complexity tooling may be required, for example, to retain shape. In those cases FAC must be contacted prior to beginning the repair.
Refer to Figure 51-00-05 for repair zones requiring FAC involvement.



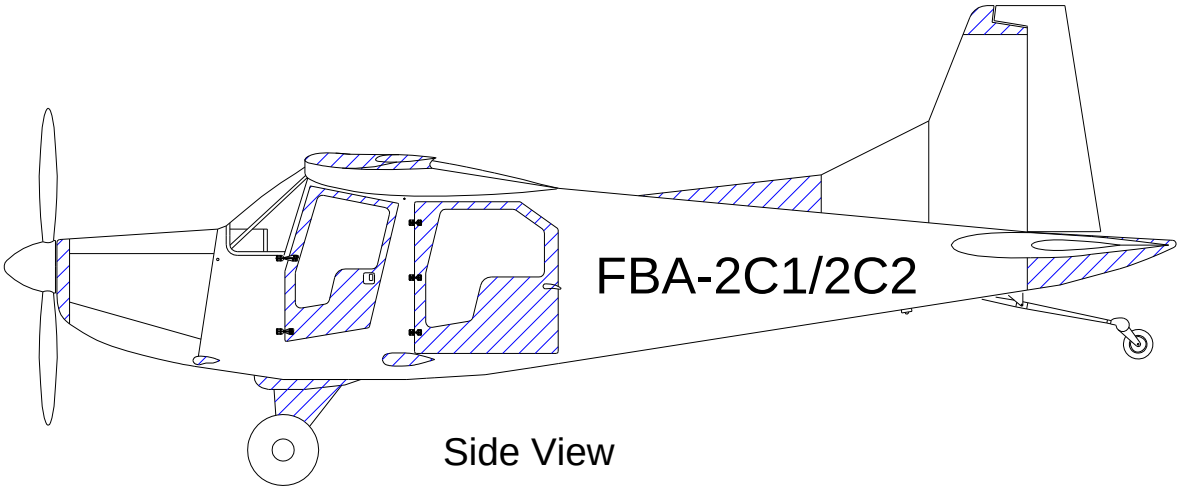
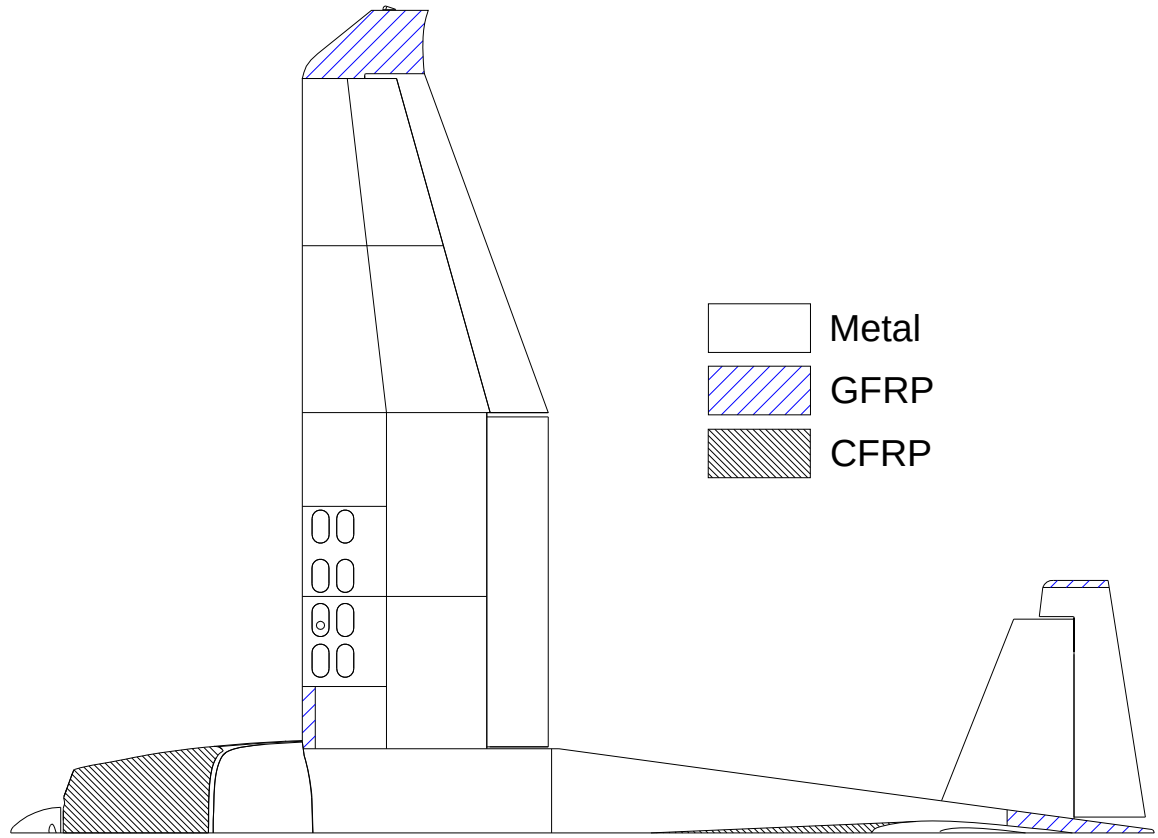
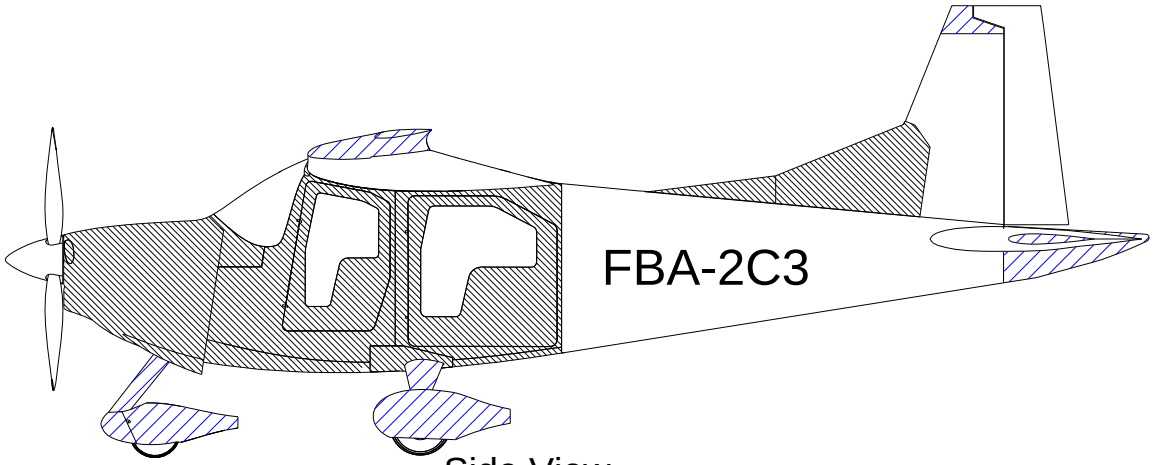


Figure 51-00-01A 2C1 and 2C2

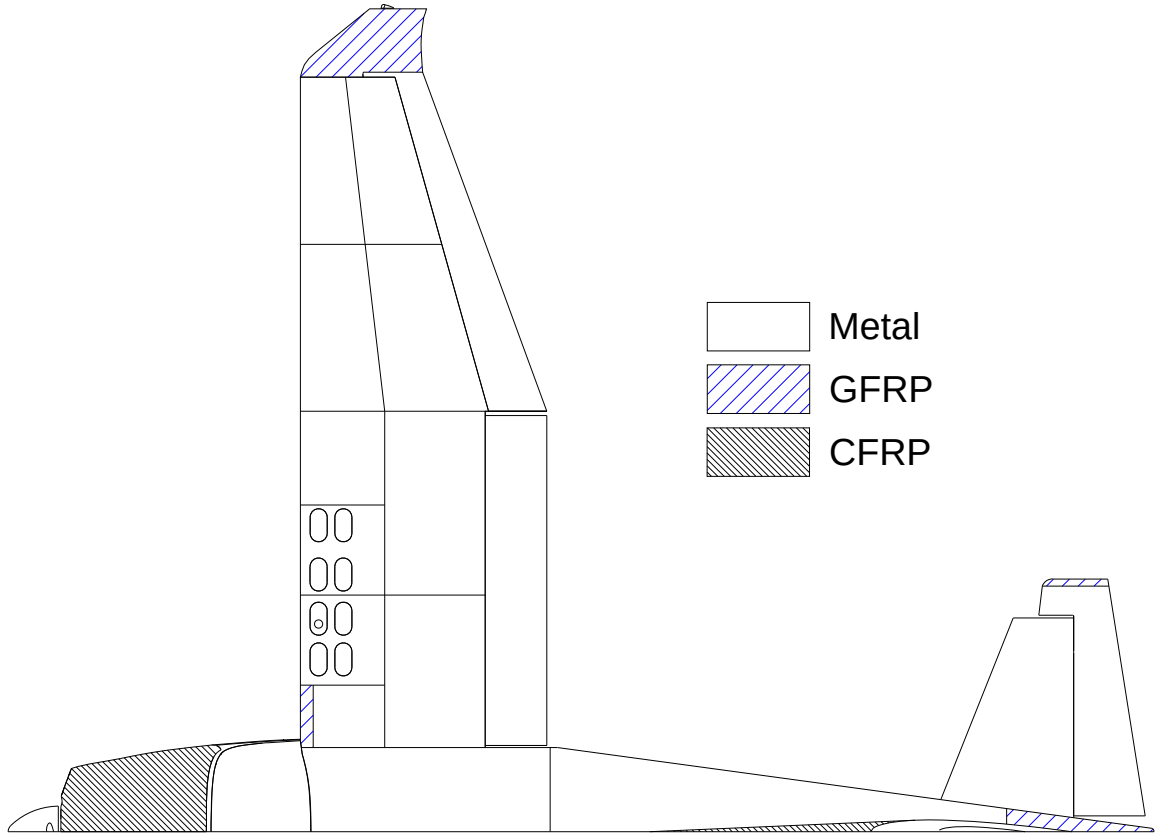


Top View

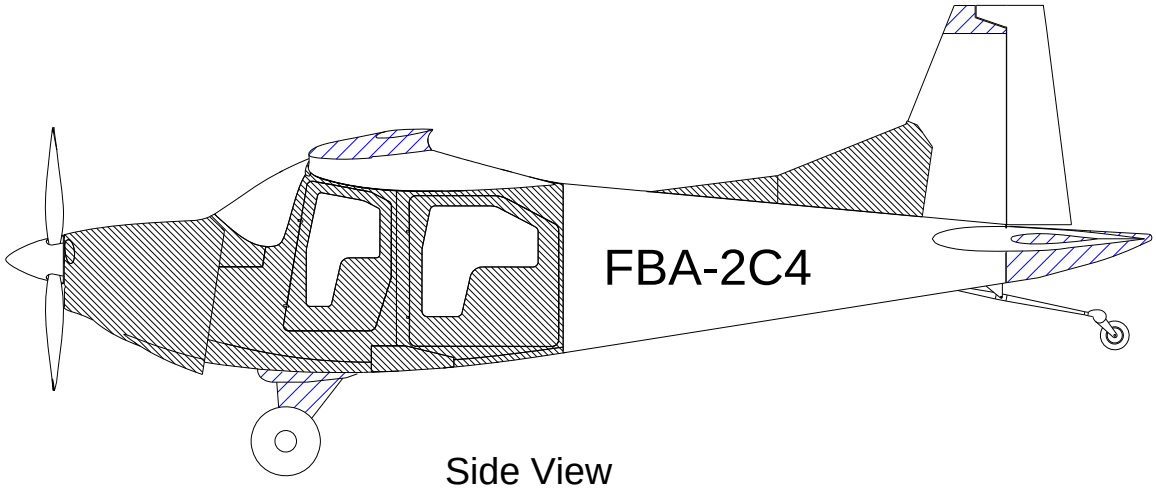


Side View

Figure 51-00-01B 2C3



Top View



Side View

Figure 51-00-01C 2C4

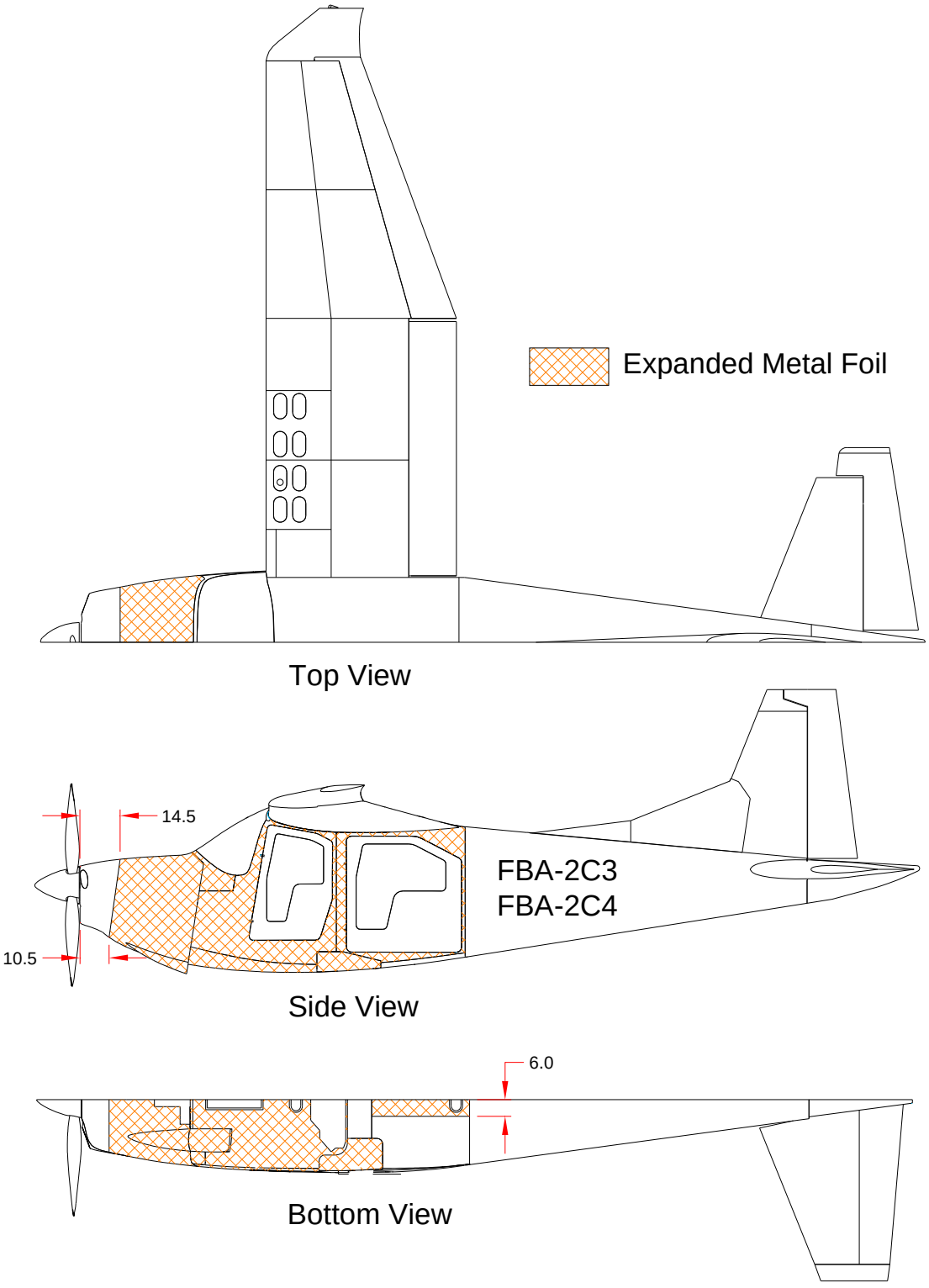


Figure 51-00-02 Lightning Strike Protection (2C3 &2C4)

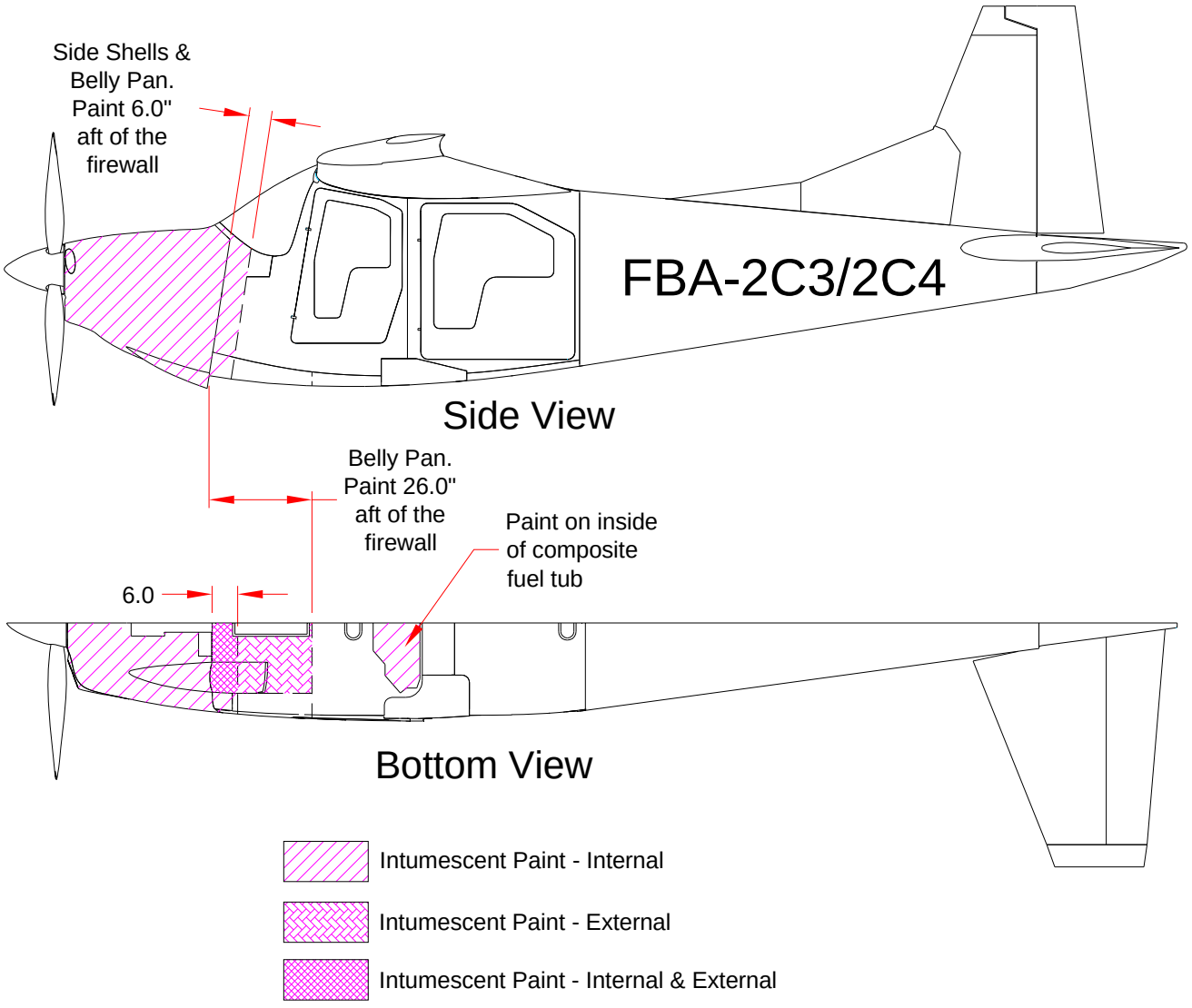


Figure 51-00-03 Intumescent Paint Coverage (2C3 & 2C4)

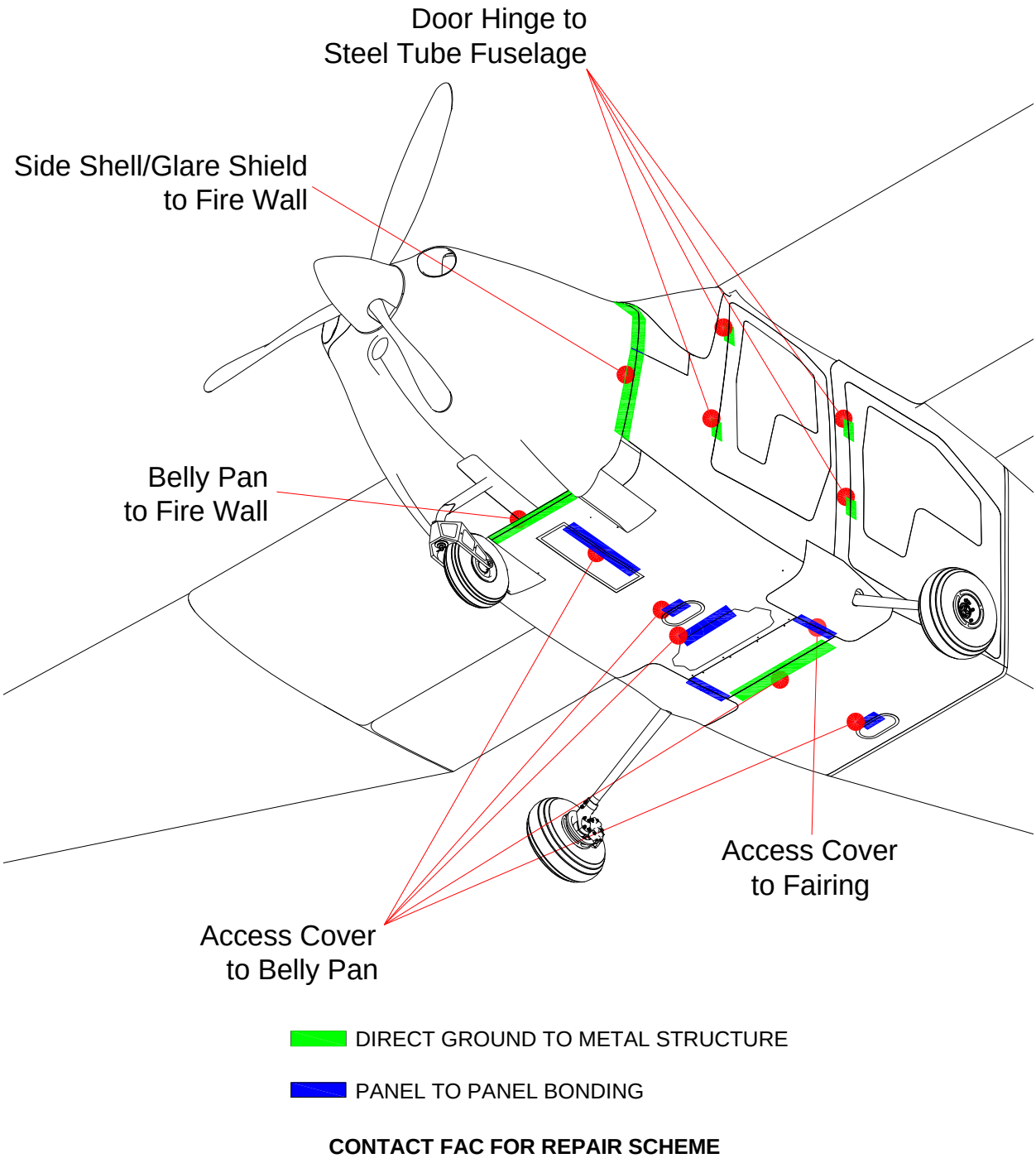


Figure 51-00-04 Designated Electrical Bonding Areas (2C3 & 2C4)

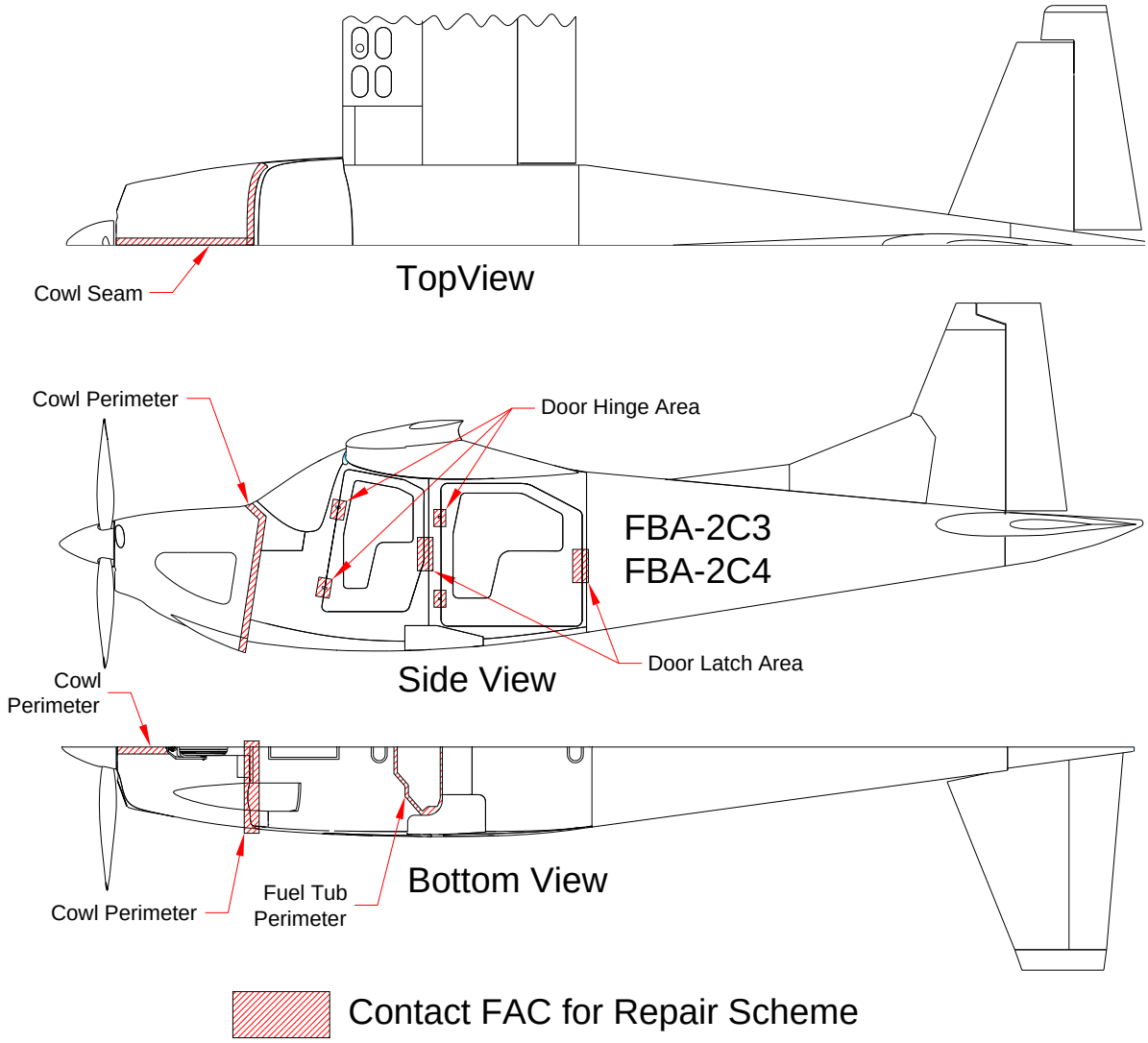


Figure 51-00-05 Repair Zones Requiring FAC Involvement (2C3 & 2C4)

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51-10 DAMAGE ASSESSMENT

1. General

Most damage to a composite structure will be visually detectable. An impact is the most common cause of damage and will usually leave visual evidence. Other types of damage are more difficult to detect visually but can be detected by simple methods. If the exterior surface is damaged, always assume that the underlying structure may also be damaged.

During damage assessment it is possible to come across manufacturing defects unrelated to the suspect damage being investigated. While these areas may or may not have been repaired they have been evaluated by FAC Quality and Engineering personnel. These areas are to be classified as pre-dispositioned by Found Aircraft and are not to be considered during damage assessment if located more than 2 inches away from the suspect damage. The distance between the suspect damage and possible manufacturing defect is measured as a shortest distance between damage extends.
If you have any concerns please contact Found Aircraft Canada.

All damage assessment shall be carried out by a qualified composite maintenance technician.

2. Types of Damage

Structural damage to composite structure can be divided into the following categories or types:

- Laminate Only:
  Damage to pure laminate including oil or fuel contamination, delaminations between plies, damage to one side of a sandwich construction that has no core damage, partial or through laminate penetration.

- Core:
  Damage to one side of a sandwich construction including gouging of core material, delaminations between the laminate and core material, oil or fuel contamination. No penetration through core or other side of sandwich.

- Sandwich Panel Penetration:
  Damage to both sides of sandwich panel including core.

- Lightning Strike Protection:
  Damage to the expanded metal foil (EMF) composing exterior ply of a laminate. Refer to Figure 51-00-02 for location.

- Fire Protection:
  Damage to intumescent paint. Refer to Figure 51-00-03 for location.

3. Damage Classification

Damage is divided into the classes described below. In doubtful cases (i.e., if you are not sure about the classification of a damage), you must contact FAC.

Class 1

- Damage to a large area, greater than 50 in^2 (including scarf), or
- Damage to designated electrical bonding area (DEBA), or
- Damage to an area defined in repair limitations section of this chapter – see Figure 51-00-05

Repairs to Class 1 damage must be approved by FAC engineering.

Class 2

- Laminate, core, or sandwich penetration to an area less that 50 in^2 (including scarf), or
- Damage to lightning strike protection - See Figure 51-00-02., or
- Damage to fire protection; - See Figure 51-00-03.

Repairs to Class 2 damage are field repairable using methods described in this chapter and do not require FAC approval.

Class 3

- Minor scratches, abrasions or similar damage which is not a crack or a puncture in the skin, or
- Damage to external paint.

Class 3 repairs are not mandatory. However, they are recommended in prevention of further damage. Repairs to Class 3 damage are field repairable using methods described in this chapter.

4. Acceptable Damage and Repair Defects

The following damage allowables are applicable to Class 2 damage. Any Class 2 damage that meets the following allowables may be classified as Class 3 damage.

DAMAGE	ALLOWABLES
Fiber Fracture	Acceptable provided the combined damage area is less than 4 in^2 per panel/part or less than 2 in^2 per single damage.
Resin Starved Areas	Acceptable provided the combined damage area is less than 4 in^2 per panel/part. Resin starved areas around fastener holes are to be treated as Delaminations Around Fastener Holes.
Delaminations	Acceptable provided the combined damage area is less than 4 in^2 per panel/part
Delaminations Around Fastener Holes	Acceptable only if the edge of the delamination does not exceed the diameter of the head on the attachment bolt/screw.
Interlaminar Voids and Foreign Material	Acceptable provided the defect areas is less than 4.0 in^2
Lightning Strike Protection (EMF)	Acceptable provided the combined loss of expanded metal foil (EMF) is less than 8 in^2 per panel/part, or 3 inches average diameter per defect.
Fire Protection	Acceptable provided damage width is less than 1/16 inch and length is less than 6 inch in case of a scratch where width is the lesser dimension, or less than 1/4 inch diameter in case of a paint chip
Oil and Fuel Contamination	To be treated as Delaminations. Oil and Fuel contamination around fastener holes are to be treated as Delaminations Around Fastener Holes

5. Damage Inspection

Damage undetectable by the following methods is considered negligible and does not require repair.

- Visual:
  The visual method can be used when the suspect area is clearly visible. This includes detecting damages to lightning strike and fire protection coating. Damage to the outer surface of the aircraft will usually crack the paint. Paint is generally more brittle than the composite and will crack before the laminate is damaged. The expanded metal foil is a copper colour and the fire protection coating may be dyed yellow for ease of recognition. However, this does not help the technician to determine the extent of the damage, only that damage has occurred. When a crack in the paint is found, further investigation is required. Paint cracks on fairings can often occur due to the flexing at their intersections. Dimples, dents or creases are also a sign of damage. Dimple and dent damage is similar in appearance to hail damage on a metal surface. Again, this does not reveal how extensive the damage is, only that it occurred. If tears or broken

fibers are visible, the part is damaged and may need a repair – see Paragraph 4 for acceptable damage criteria.
Separation between plies of a laminate (delamination) or between the laminate and the core is more difficult to detect. This type of damage may evidence itself in the form of a raised area or puckering outward of the skin. It is sometimes possible to feel this type of damage by pressing on the area. A disbond or delamination may feel soft and movement between the separated layers may be detected. If possible, the backside of the suspected area should be examined. Use of a borescope, if available, is highly recommended to assess internal damage. The interior surfaces are usually not painted and damage to glass-fabric structures will show up as a white area. The white color indicates separation of fabric from resin, which changes the way light refracts in the laminate.

- Coin Tap:
  Coin tap is just what the name implies, tapping with a coin, or similar object. By tapping at a consistent rate and energy, it is possible to audibly detect discontinuities in the underlying surface. The coin tap method is useful for detecting delamination and disbonds. Areas of disbond or delamination will sound flat or hollow, undamaged areas should sound sharp and clear. The coin tap method helps to assess damage in hard to see areas and when disbond or delamination is suspected. All suspect areas, including obvious damage, should be checked with the Coin Tap method. This method will help determine the extent of damage and whether or not the aircraft can be field repaired. The coin tap method is effective if used properly. It is important that the area being investigated is similar to a standard, or undamaged area, to which it is compared. For instance, if the suspected area lies directly over reinforcement, or is sandwich construction, the reference area should also be this type of construction. In addition, this method can only be used to evaluate one side at a time of a sandwich panel. For example, coin tap will not be effective to evaluate damage to the inside skin of a sandwich panel by tapping the external skin.

51-20 REPAIR PROCESS

1. General

The following are general practices used during composite repair processes and how to repair Class 2 and 3 damage to the composite structure. Refer to Section 51-10 for data regarding damage classification. Class 1 damage may only be repaired in accordance with a repair scheme approved by Found Aircraft Canada (FAC).
The quality of all repairs is directly related to application of proper preparation procedures. This includes: cleaning and preparing the damaged area, cutting reinforcements, mixing and applying resin and curing the repair. A repair technician must be familiar with these practices prior to attempting composite repairs.

Note 1**:** You must only use the materials approved by FAC when conducting repairs this includes approved resin systems. Never substitute another resin system. Always follow material manufacturer's recommendations.
Note 2**:** Always familiarize yourself with repair process before attempting the repair. Ensure all required tools and materials are available in advance.
Note 3**:** It is recommended to use vacuum pressure during cure cycle. See Paragraph 4 of this section for details.
Note 4**:** All repairs shall be carried out by a qualified composite maintenance technician.

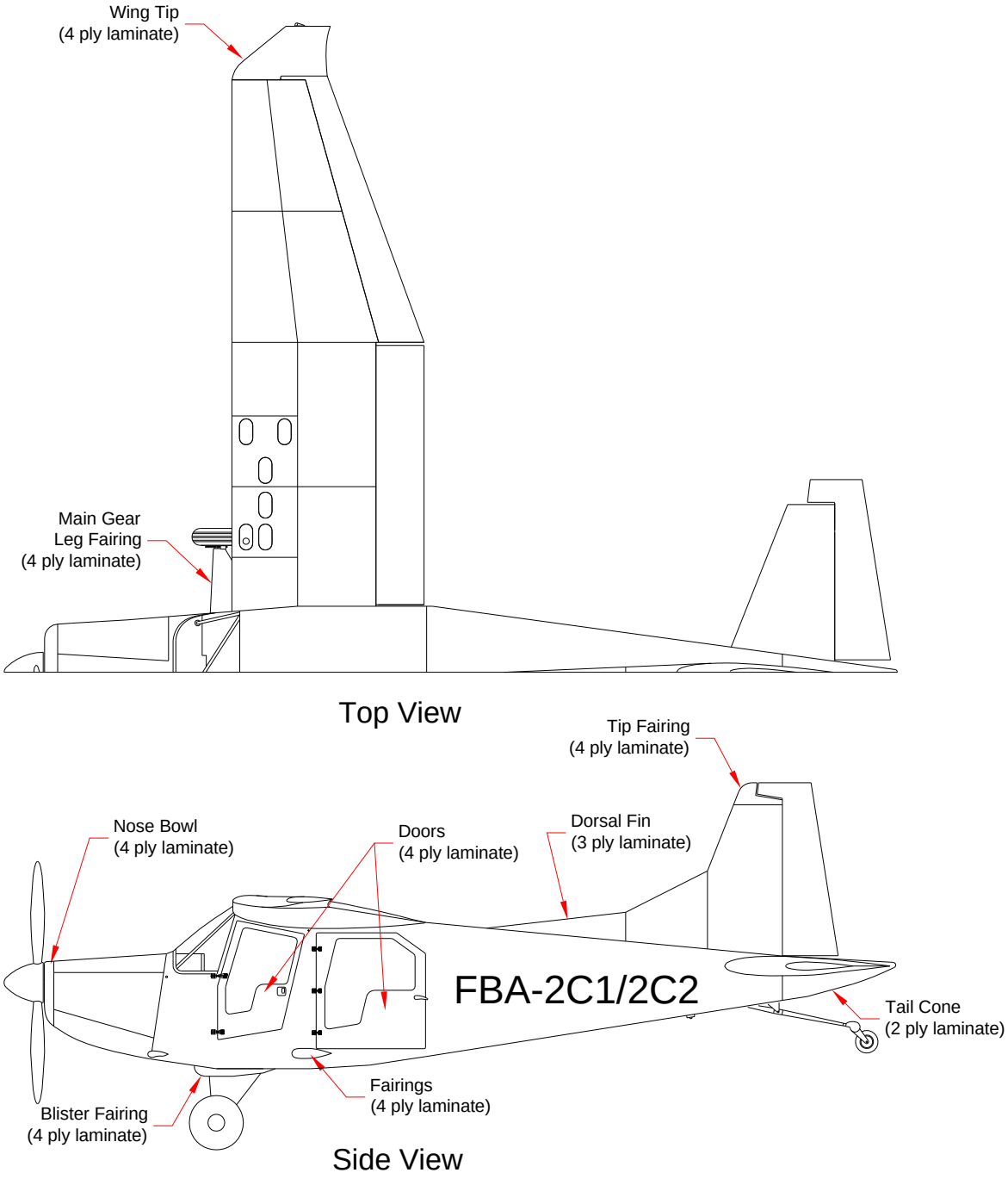

Figure 51-20-01A Basic Layup Diagram (2C1 & 2C2)

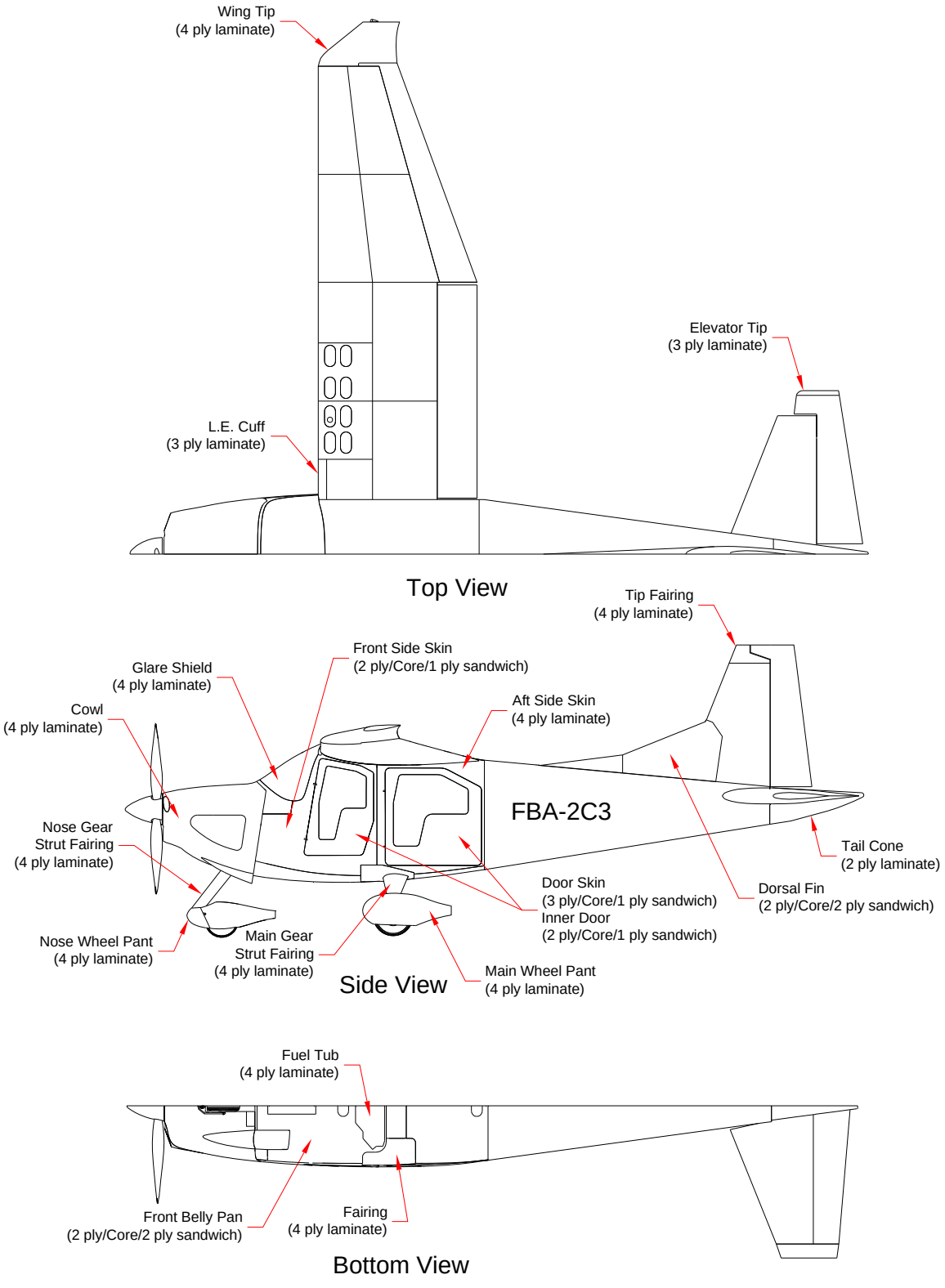

Figure 51-00-01B Basic Layup Diagram (2C3)

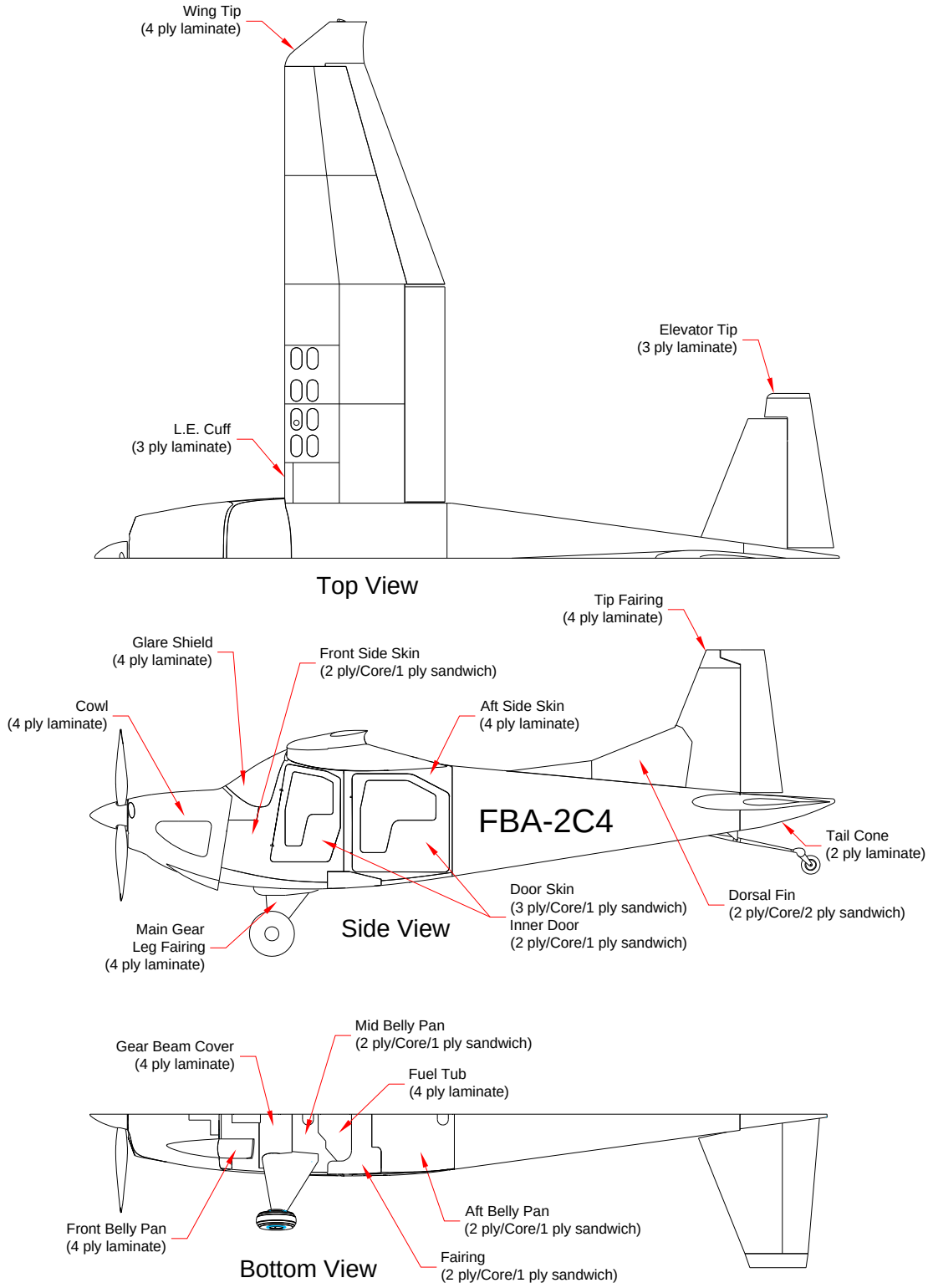

Figure 51-20-01C Basic Layup Diagram (2C4)

2. Class 3 Repair Process

Step 1. Determine the extent of damage using methods described in 51-10.

WARNING
USE PROTECTIVE EQUIPMENT.
DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

Step 2. Sand the repair area with 80-120 grit sanding paper minimum of 1.0" from the edge of the damage.

WARNING
DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.

DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.

CAUTION: When using Acetone wipe the repair area immediately after solvent application as it can damage the composite matrix.

Step 3. Make sure that the area to be repaired is clean and free from any contaminants. If necessary clean with Acetone
Step 4. Protect the area of the structure around the repair from contamination by the repair materials. Use plastic/polythene sheet material held in place by self adhesive tape.
Step 5. Apply filler to the repair area to fill any damage. Follow material manufacturer's instructions. Fill to the original contour of the structure.
Step 6. Allow the filler to cure. Follow material manufacturer's instructions for cure times.
Step 7. Lightly sand the filler with 150-180 grit sanding paper.
Step 8. Prime with epoxy primer. Allow to dry. Follow material manufacturer's instructions for drying times and temperatures.
Step 9. Apply spot putty as required. Follow material manufacturer's instructions for cure times.
Step 10. Lightly sand with 220-240 grit sanding paper.
Step 11. Make sure the repair area is clean and free from any contaminants. If necessary use Acetone and re-sand if necessary.
Step 12. Apply paint and allow it to dry. Follow material manufacturer's instructions for drying times and temperatures.

3. Class 2 Repair Process

A. Laminate Repair:

Step 1. Remove damaged/loose laminate until the edges of the laminates bond together.
Step 2. Determine the extent of damage using methods described in 51-10.

WARNING
USE PROTECTIVE EQUIPMENT.
DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

Step 3. Scarf the edges of the repair area with a grinding disk or block. Refer to Figure 51-20-02 or Figure 51-20-03 for scarf size.
Step 4. Count the layers of fabric required for repair. Refer to Figure 51-20-01 for basic layup diagram. If uncertain, contact FAC for assistance. The repair must consist of the same number of repair plies as the original laminate plus at least one extra ply.
Step 5. Cut repair plies to size. Refer to Figure 51-00-01 for type of cloth required. Fiber orientation is not critical.

WARNING
DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.

DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.

CAUTION: When using Acetone wipe the repair area immediately after solvent application as it can damage the composite matrix.

CAUTION: There must be no grease or dust on the repair area. Grease and/or dust prevent a good bond.

Note**:** Laminates that have come in contact with moisture must be dried before performing any repair. If moisture contamination is confined to a small area, the area may be dried with a heat gun. Dry the contaminated area for at least two minutes while keeping the nozzle a minimum of 10 inches from the part.

Step 6. Clean the area of the repair. If you use acetone to remove any grease or dirt then you must re-sand the repair area.

Step 7. Protect the area of the structure around the repair from contamination by the repair materials. Use plastic/polythene sheet material held in place by self adhesive tape.

WARNING

DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE.

DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE A DISEASE.

Step 8. Mix adequate amount of resign and hardener to cover entire repair area.
Step 9. Pre-impregnate the repair plies with mixed resin one at a time. Ensure complete coverage. Keep the repair plies separate so they don't come in contact with each other.
Step 10. Remove excess resin from each repair ply using a roller, or squeegee, or tongue depressor.
Step 11. Apply a thin coat of resin to the repair.
Step 12. Apply the first layer of pre-impregnated repair plies to the repair. Fiber orientation is not critical.
Step 13. Remove trapped air with a stipple brush, or roller, or squeegee.
Step 14. Apply the next layer of cloth.
Step 15. Repeat steps 12 and 13 until all the repair plies are in place.
Step 16. Remove trapped air with a roller or squeegee.
Step 17. Cure the repair. Follow material manufacturer's instructions for cure times and temperatures.
Cure using vacuum pressure is recommended. See Paragraph 4
Step 18. Sand the repair area with 80-120 grit sanding paper to remove any rough edges and to even the repair with the surrounding structure.

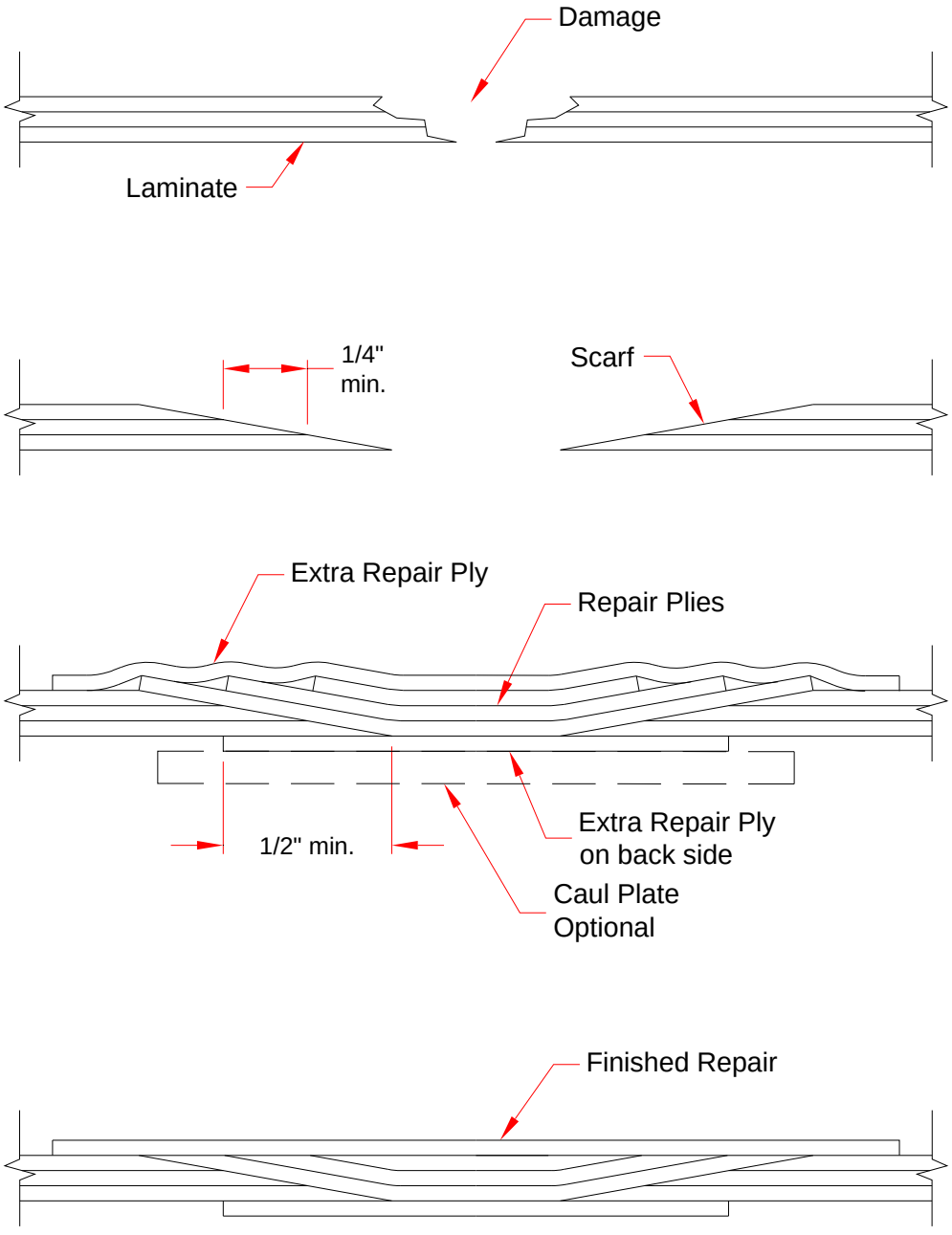

Figure 51-20-02 Laminate Repair – Penetration

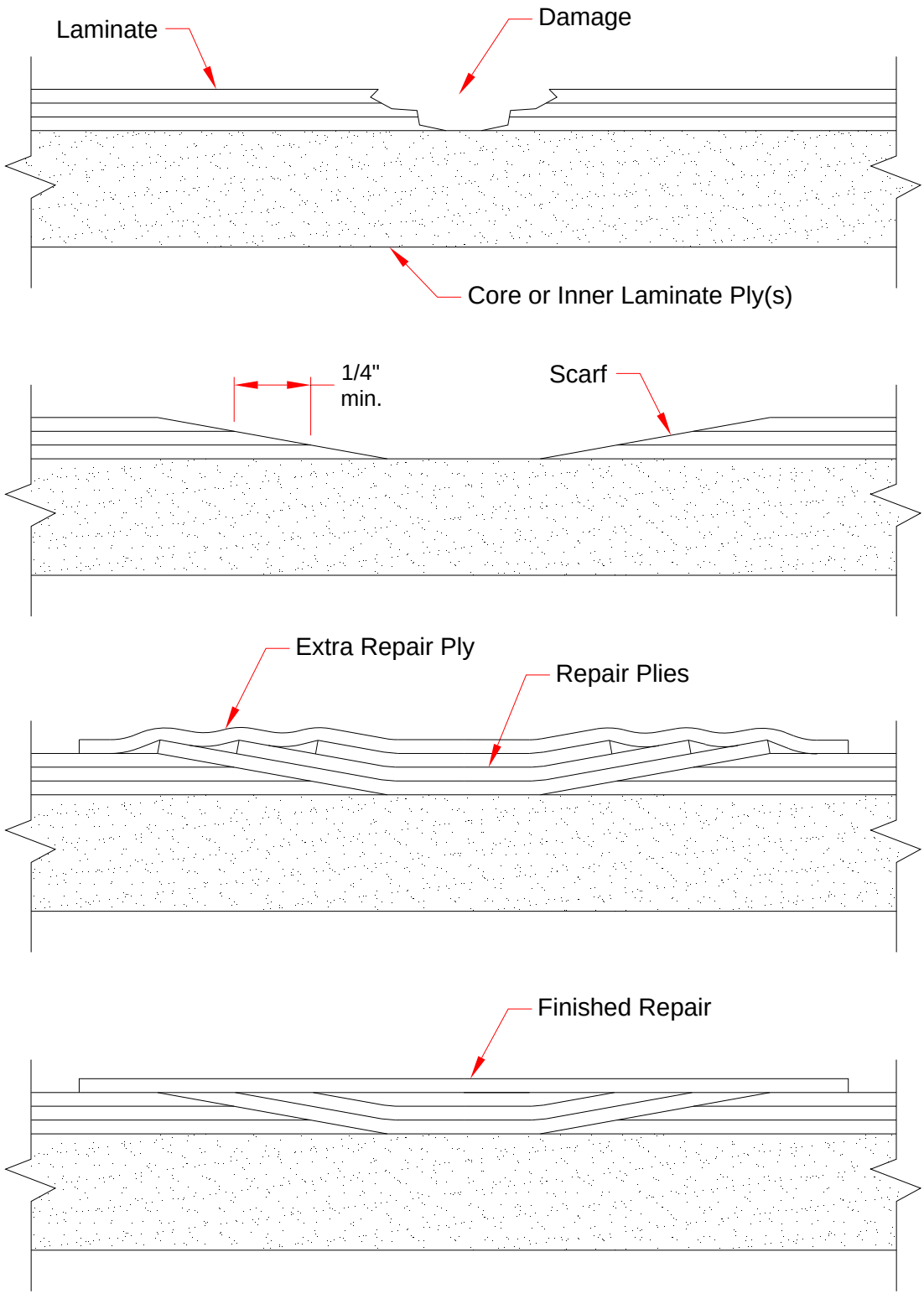

Figure 51-20-03 Laminate Repair – No Penetration

B. Core Repair:

Step 1. Remove damaged/loose laminate and core until the edges of the laminates bond together.
Step 2. Determine the extent of damage using methods described in 51-10.
Step 3. Remove the damaged foam core.

WARNING
USE PROTECTIVE EQUIPMENT.
DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

Step 4. Scarf the edges of laminate with a grinding disk or block. Refer to Figure 51-20-04 for scarf size.
Step 5. Count the layers of fabric required for repair. Refer to Figure 51-20-01 for basic layup diagram. If uncertain, contact FAC for assistance. The repair must consist of the same number of repair plies as the original laminate plus at least one extra ply.
Step 6. Cut repair plies to size. Refer to Figure 51-00-01 for type of cloth required. Fiber orientation is not critical.

WARNING
DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.

DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.

CAUTION: When using Acetone wipe the repair area immediately after solvent application as it can damage the composite matrix.

CAUTION: There must be no grease or dust on the repair area. Grease and/or dust prevent a good bond.

Note**:** Laminates that have come in contact with moisture must be dried before performing any repair. If moisture contamination is confined to a small area, the area may be dried with a heat gun. Dry the contaminated area for at least two minutes while keeping the nozzle a minimum of 10 inches from the part.

Step 7. Clean the area of the repair. If you use acetone to remove any grease or dirt then you must re-sand the repair area.
Step 8. Protect the area of the structure around the repair from contamination by the repair materials. Use plastic/polythene sheet material held in place by self adhesive tape.

Step 9. Fill void in core with filler. Allow to cure. Follow material manufacturer's instructions for cure times and temperatures.
Step 10. Sand flush excess filler. Use 80-120 grit sanding paper.
Step 11. Clean repair area. Repair area must be free of dust or other contaminates.

WARNING
DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE.

DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE A DISEASE.

Step 12. Mix adequate amount of resign and hardener to cover entire repair area.
Step 13. Pre-impregnate the repair plies with mixed resin one at a time. Ensure complete coverage. Keep the repair plies separate so they don't come in contact with each other.
Step 14. Remove excess resin from each repair ply using a roller, or squeegee, or tongue depressor.
Step 15. Apply a thin coat of resin to the repair.
Step 16. Apply the first layer of pre-impregnated repair plies to the repair. Fiber orientation is not critical.
Step 17. Remove trapped air with a stipple brush, or roller, or squeegee.
Step 18. Apply the next layer of cloth.
Step 19. Repeat steps 12 and 13 until all the repair plies are in place.
Step 20. Remove trapped air with a roller or squeegee.
Step 21. Cure the repair. Follow material manufacturer's instructions for cure times and temperatures.
Cure using vacuum pressure is recommended. See Paragraph 4
Step 22. Sand the repair area with 80-120 grit sanding paper to remove any rough edges and to even the repair with the surrounding structure.

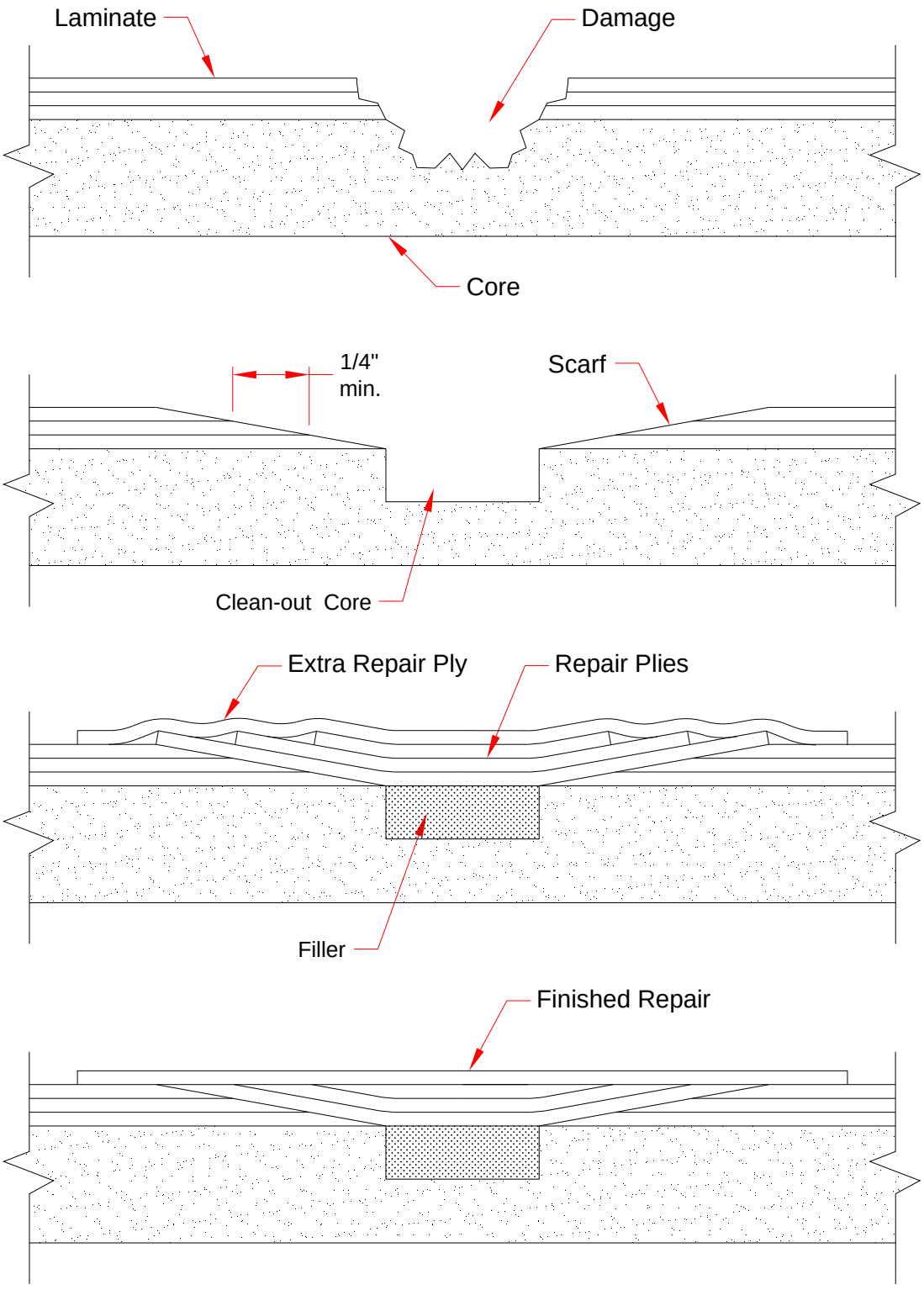

Figure 51-20-04 Core Repair

C. Sandwich Structure Repair:

Step 1. Remove damaged/loose laminate and core until the edges of the laminates bond together.
Step 2. Determine the extent of damage using methods described in 51-10.
Step 3. Clean-out inner laminate. Refer to Figure 51-20-05.
Step 4. Remove the damaged foam core. Remove sufficient foam core to give a minimum of 3/8 inch edge around the damaged inner laminate.

WARNING
USE PROTECTIVE EQUIPMENT.
DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

Step 5. Scarf the edges of laminate with a grinding disk or block. Refer to Figure 51-20-05 for scarf size.
Step 6. Cut and shape a piece of foam core to replace the damaged foam core that was removed.
Step 7. Prepare the layers of cloth needed to laminate on the inner surface of the foam core. Use 2 plies of cloth. Fibre orientation is not critical. Refer to Figure 51-00-01 for type of cloth required.
Step 8. Count the layers of fabric required for repair. Refer to Figure 51-20-01 for basic layup diagram. If uncertain, contact FAC for assistance. The repair must consist of the same number of repair plies as the original laminate plus at least one extra ply..
Step 9. Cut repair plies to size. Fiber orientation is not critical.

WARNING
DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.

DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.

CAUTION: When using Acetone wipe the repair area immediately after solvent application as it can damage the composite matrix.

CAUTION: There must be no grease or dust on the repair area. Grease and/or dust prevent a good bond.

Note**:** Laminates that have come in contact with moisture must be dried before performing any repair. If moisture contamination is confined to a small area, the area may be dried with a heat gun. Dry the contaminated area for at least two minutes while keeping the nozzle a minimum of 10 inches from the part.

Step 10. Clean the area of the repair. If you use acetone to remove any grease or dirt then you must re-sand the repair area.
Step 11. Protect the area of the structure around the repair from contamination by the repair materials. Use plastic/polythene sheet material held in place by self adhesive tape.

WARNING
DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE.

DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE A DISEASE.

Step 12. Mix adequate amount of resign and hardener to cover the inner laminate repair area only.
Step 13. Pre-impregnate the inner repair plies (2) with mixed resin one at a time. Ensure complete coverage. It is acceptable to pre-impregnate both plies at the same time as a stack.
Step 14. Remove excess resin from inner repair plies using a roller, or squeegee, or tongue depressor.
Step 15. Apply a coat of thickened resin to the foam core in repair area.
Step 16. Apply a coat of thickened resin to the bottom of the foam core plug.
Step 17. Apply a thin coat of resin to the inner laminate in the repair area.
Step 18. Insert inner laminate repair plies.
Step 19. Insert foam core plug. Resin end in.
Step 20. Cure the repair. Follow material manufacturer's instructions for cure times and temperatures.
Step 21. Sand flush excess core and cured resin with 80-120 grit sanding paper.
Step 22. Clean repair area. Repair area must be free of dust or other contaminates.
Step 23. Mix adequate amount of resign and hardener to complete the repair.
Step 24. Pre-impregnate the repair plies with mixed resin one at a time. Ensure complete coverage. Keep the repair plies separate so they don't come in contact with each other.
Step 25. Remove excess resin from each repair ply using a roller, or squeegee, or tongue depressor.
Step 26. Apply a thin coat of resin to the repair area.
Step 27. Apply the first layer of pre-impregnated repair plies to the repair. Fiber orientation is not critical.
Step 28. Remove trapped air with a stipple brush, or roller, or squeegee.
Step 29. Apply the next layer of cloth.
Step 30. Repeat steps 28 and 29 until all the repair plies are in place.
Step 31. Remove trapped air with a roller or squeegee.
Step 32. Cure the repair. Follow material manufacturer's instructions for cure times and temperatures.
Cure using vacuum pressure is recommended. See Paragraph 4

Step 33. Sand the repair area with 80-120 grit sanding paper to remove any rough edges and to even the repair with the surrounding structure.

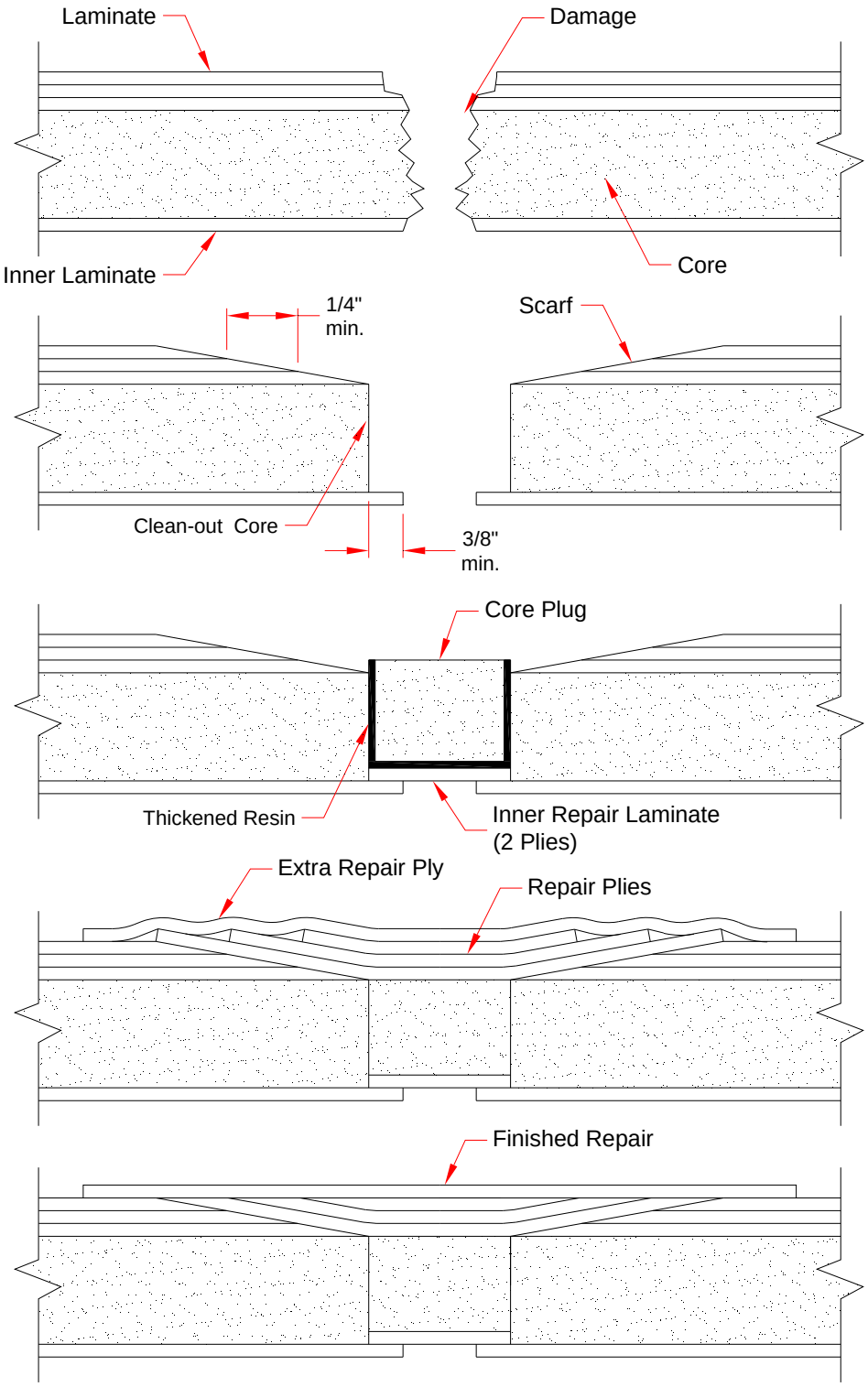

Figure 51-20-05 Sandwich Structure Repair

D. Expanded Metal Foil Repair:

Step 1. Determine the extent of damage using methods described in 51-10.

CAUTION: Do not sand the expanded metal foil after it becomes shiny. The foil is very thin and can easily be sanded through.

Step 2. Expose a minimum of 2.25 inch of expanded foil around damage perimeter by **lightly** sanding the resin using 120 grit or finer sanding paper. See Figure 51-20-06.

Step 3. Prepare a repair ply of expanded metal foil. The repair ply must overlap original foil by at least 2 inch.

WARNING
USE PROTECTIVE EQUIPMENT.
DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

Step 4. Using 120-grit sand paper or finer, lightly sand repair ply until exposed and shiny. During sanding, periodically clean the area to ensure that the expanded foil is not being damaged.

WARNING
DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.

DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.

CAUTION: When using Acetone wipe the repair area immediately after solvent application as it can damage the composite matrix.

CAUTION: There must be no grease or dust on the repair area. Grease and/or dust prevent a good bond.

Note**:** Laminates that have come in contact with moisture must be dried before performing any repair. If moisture contamination is confined to a small area, the area may be dried with a heat gun. Dry the contaminated area for at least two minutes while keeping the nozzle a minimum of 10 inches from the part.

Step 5. Clean the area of the repair. If you use acetone to remove any grease or dirt then you must re-sand the repair area.

Step 6. Protect the area of the structure around the repair from contamination by the repair materials. Use plastic/polythene sheet material held in place by self adhesive tape.

WARNING
DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE.

DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE A DISEASE.

Step 7. Mix adequate amount of resign and hardener to complete the repair.
Step 8. Apply a thin coat of resin to the repair area.
Step 9. Apply a thin coat of resin to the repair ply.
Step 10. Apply the repair ply to the repair area.

Note**:** Repair ply of expanded metal foil may be cured with wet lay-up portion of outer laminate repair.

Step 11. Cure the repair. Follow material manufacturer's instructions for cure times and temperatures.
Cure using vacuum pressure is recommended. See Paragraph 4
Step 12. Perform conductivity test, using a digital ohmmeter. Check the repaired area to a local area close to the repair. Sand small area of the undamaged portion of the panel with 120 grit or higher sanding paper to expose metal foil to ensure conductivity to the repaired area. Resistance should measure less than 1/2 ohm. Higher readings require the repair to be redone.
Step 13. Restore surface coatings, if any.

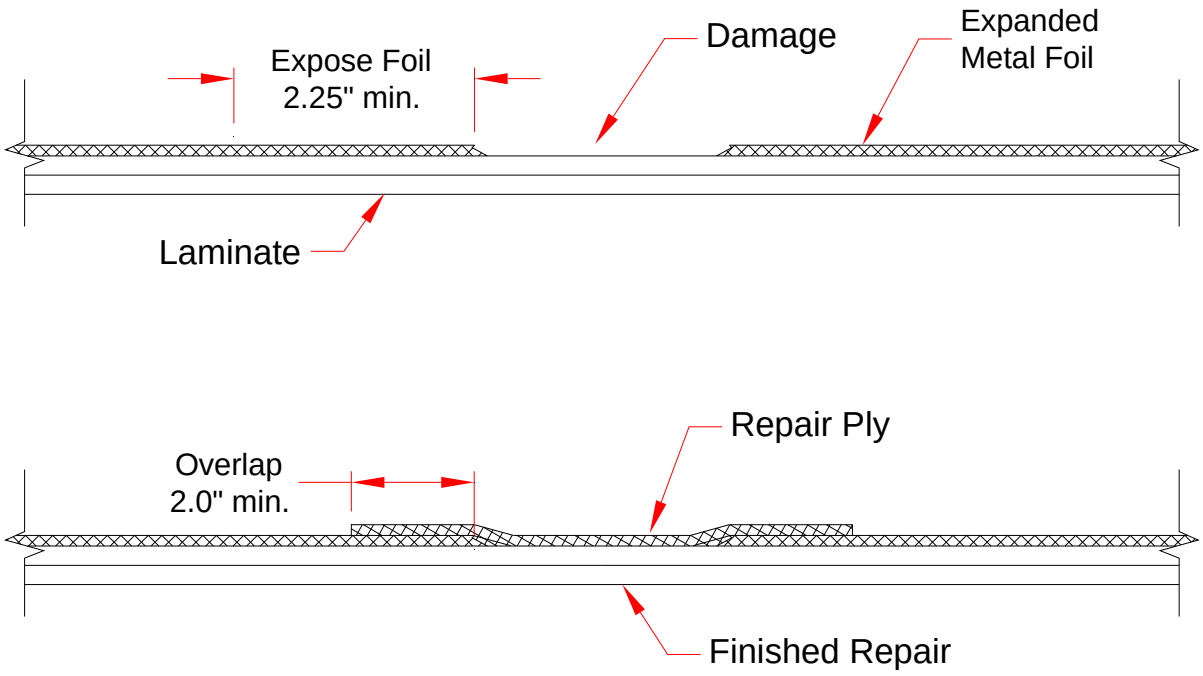

Figure 51-20-06 Expanded Metal Foil Repair

E. Fire Protection Repair:

Step 1. Determine the extent of damage using methods described in 51-10.

WARNING
USE PROTECTIVE EQUIPMENT.
DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

Step 2. Scuff the repair area with 220-240 grit sanding paper.

WARNING
DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.

DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.

Step 3. Make sure that the area to be repaired is clean and free from any contaminants. If necessary use Acetone.

Note **:** Intumescent paint application over epoxy primer is preferred but not required for best adhesion.

Step 4. Apply intumescent paint to repair area and allow it to dry. Ensure complete coverage of the repair area. Follow material manufacturer's instructions for drying/curing times and temperatures.

Step 5. Apply top coat, if required. Surface preparation for cured intumescent paint includes light surface scuffing and cleaning with isopropyl (99%) alcohol.

4. Vacuum Pressure Repair Process

Step 1. Prepare repair per paragraph 3 up to the final cure step.
Step 2. Cut peel ply to size. Peel ply must extend at least ½ inch past all edges of the repair - See Figure 51-20-07. Lay in place.
Step 3. Cut perforated release film to size. The film must extend at least 2.0 inch past all edges of the repair. Lay in place.
Step 4. Cut bleeder material to size. It must extend at least 4.0 inch past all edges of the repair. Lay in place.
Step 5. Cut non-perforated release film to size. The film must be the same size as the perforated release film. Lay in place.
Step 6. Cut insulation breather cloth to size. It must be the same size as the bleeder material and non-perforated release film. Lay in place.

Step 7. Cut breather cloth pad. It must be at least ¼ inch larger than the base of a vacuum port. Lay in place.
Step 8. Place vacuum port on breather cloth pad.
Step 9. Apply vacuum bag sealant tape around the perimeter of the repair.

Step 10. Cut vacuum bag to size. Lay in place.
Step 11. Seal the perimeter.
Step 12. Attach vacuum source to vacuum port.
Step 13. Check for leaks. Seal as required.
Step 14. Minimum recommended vacuum pressure is 9 psi (18.5 inch of mercury).

Note **:** Higher vacuum pressure will result in better repair.

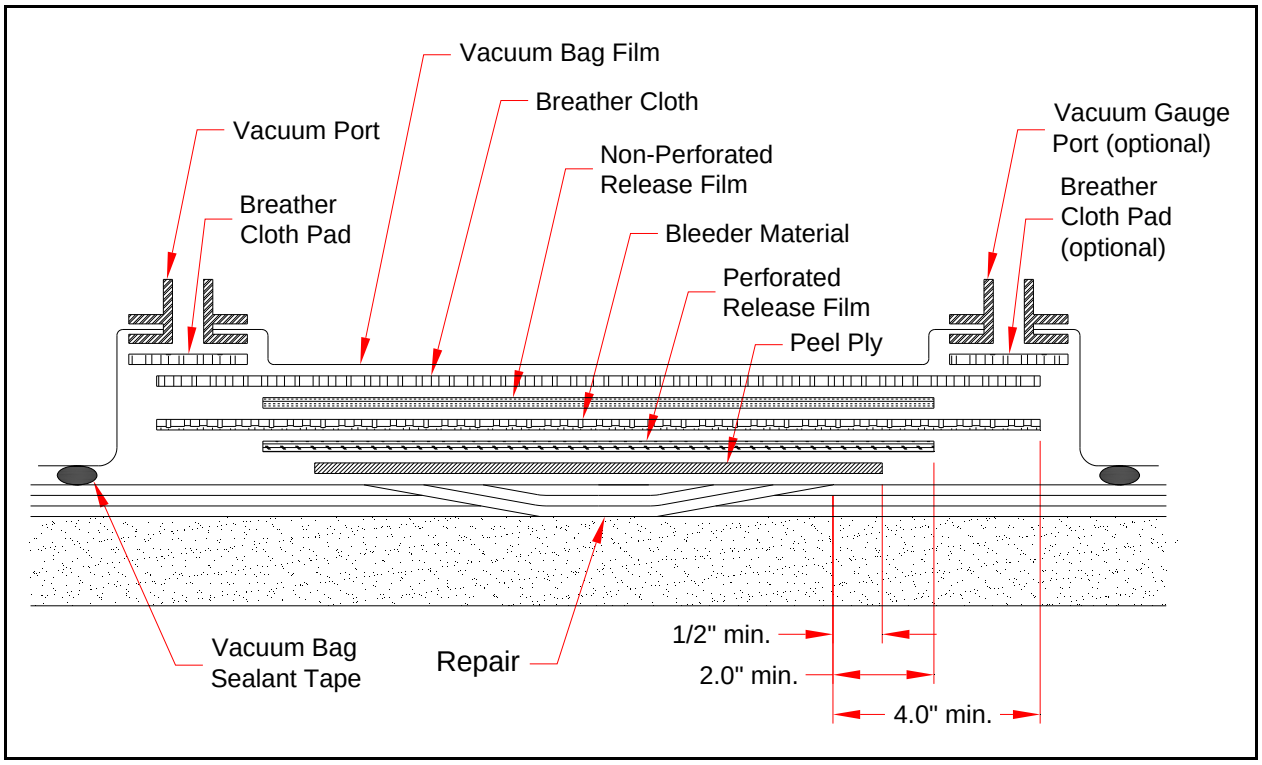

Figure 51-20-07 Vacuum Pressure Repair

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51-30 MATERIALS

1. General

You must only use approved materials from approved sources to repair the aircraft parts. Any material substitutions not covered in this section must be approved by Found Aircraft Canada.

2. Approved Repair Materials

A. Glass Fiber Cloth:

- 7781 E-glass, 8.7 oz/sy, Satin Weave
  8 Harness
  MIL-C-9084

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

B. Carbon Fiber Cloth:

- 5.7oz/sy, Plain Weave
  Count: 12 x 12
  Fibers: Warp = 3k T-300; Fill = 3k T-300
  Finish: Greige

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

C. Microfibers:

- West System 403 Microfibers
- West System 404 Microfibers

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

D. Core Material:

- PVC rigid foam, Divinycell H80
  6mm (1/4 inch) nominal thickness

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

E. Expanded Metal Foil:

- Dexmet Expanded Copper Foil, Part No. 2CU6-100A
  0.022 lbs/SF, 0.005" thick (nominal)

Suggested Supplier: Dexmet Corporation
Naugatuck, CT 06770, USA
Tel: (203) 723-1514
www.dexmet.com

F. Resin System:

- Laminating Resin:
  Resin: MGS Laminating Resin Part No. L285
  Hardener: 60:40 mix by weight of MGS 287 (60%) and 285 (40%) hardeners
  Mixture: 100 part resin to 40 parts hardener by weight.

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

- Thickened Resin:
  Mix of Laminating Resin and Microfibers
  Mixture: 50:50 by volume

G. FillerMaterial:

- AEROPOXY Light, Epoxy Filler:
  The mix ratio is 2:1 - 2 parts resin (Part A) to 1 part hardener (Part B) by weight or volume.

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

H. Spot Putty:

- 3M, Acryl Spot Putty or equivalent light weight polyester finishing and spot putty.

Suggested Supplier: Any source

I. Epoxy Primer:

- Epoxy primer per MIL-P-23377

Suggested Supplier: Downing Products Ltd
4090 Ridgeway Drive, Unit 11 & 12
Mississauga, ON, Canada, L5L 5X5
Tel: (905) 828-2399
Fax: (905) 569-0302
www.downing.com

J. Epoxy Paint:

- Epoxy paint per MIL-P-22750

Suggested Supplier: Downing Products Ltd
4090 Ridgeway Drive, Unit 11 & 12
Mississauga, ON, Canada, L5L 5X5
Tel: (905) 828-2399
Fax: (905) 569-0302
www.downing.com

K. Intumescent Paint:

- Flame Control No.46081

Suggested Supplier: Flame Control Coatings Canada
75 Chambers Drive, Unit 9
Ajax, ON, Canada, L1Z 1E1
Tel: (905) 619-0115
Fax: (905) 619-6583
www.flamecontrol.ca

3. Consumable Materials

A. Peel Ply:

- Airtech, Econo Peel Ply J, E, Econolease or equivalent

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

B. Release Films:

- Airtech, Perforated Release Film 5200R, or equivalent
- Airtech, Non-perforated Release Film 5200R, or equivalent

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

C. Bleeder Material:

- Glass Fiber Cloth

D. Breather Cloth:

- Airtech, Airweave N4 or N7 breather cloth, or equivalent

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

E. Vacuum Bagging Film:

- Airtech, Econolon Bagging Film or equivalent 1.5 mil nylon film
- Airtech, WL6400 or WL7400 begging film

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

F. Sealant Tape:

- Airtech, AT-200Y, or GS100, or GS213, or equivalent Sealant Tape

Suggested Supplier: Composites Canada
5205 Timberlea Blvd.
Mississauga, ON, Canada, L4W 2S3
Tel: (905) 629-3178
Toll Free: 1-877-773-7336
Fax: (905) 629-2638
www.compositescanada.com

G. Other:

- Paint Brush
- Roller
- Tongue Depressor/Stir Stick
- Mixing Container
- Squeegee
- Masking Tape
- Sanding Paper, 80-120, 150-180, 220-240 grit
- Dust Mask
- Latex Gloves
- Acetone
- Cotton Cloth (Clean)

Suggested Supplier: Any source

51-40 FASTENERS

1. General

There are 2 main types of fasteners used throughout composite structures. These are quick release “Camloc” fasteners for engine cowlings, and screws for all access panels as well as composite structure attachments.

Carbon fibre is susceptible to inducing corrosion in aluminum and cad plated steel fasteners unless properly protected. To reduce the possibility of corrosion with carbon fiber components, corrosion resistance fasteners are used. Also, corrosion resistance rivets are used to secure nut plates and “Camloc” receptacles to carbon fiber components.

When replacing a fastener it is critical to do so with correct type and length.

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