

CHAPTER 25

DOORS AND WINDOWS

<i>Section</i>	<i>Title</i>	<i>Page</i>
25-00	Description . . . . .	25.1
25-10	Door Assembly . . . . .	25.1
25-20	Windshield Installation . . . . .	25.3
25-21	Standard (Acrylic) Windshield Installation . . . . .	25.3
25-22	Impact-Resistant (Polycarbonate) Windshield Installation . . . . .	25.6

Intentionally Blank

## CHAPTER 25

## DOORS AND WINDOWS

25-00 Description

Both cabin doors may be removed and installed by maintenance personnel or pilots.

Two windshield halves are retained in aluminum frames and an aluminum tubular bow oriented vertically along the helicopter's centerline. A standard (acrylic) windshield installation and an impact-resistant (polycarbonate) windshield installation are available. Refer to § 25-20 for detailed description.

25-10 Door Assembly**A. Cleaning**

Refer to § 23-10 Part B for cleaning windows.

**B. Removal**

Remove cotter pins from door hinge pins. Open door and lift door pins from door frame hinge assemblies and remove door. Adjust weight and balance per R22 Pilot's Operating Handbook Section 6.

**C. Installation****WARNING**

**Failure to install a cotter pin in each door's two hinge pins may allow door to depart aircraft in flight.**

1. Align and insert door hinge pins in door frame hinge assemblies; latch door.
2. Install a cotter pin in both upper and lower door hinge pins.
3. Adjust weight and balance per R22 Pilot's Operating Handbook Section 6.

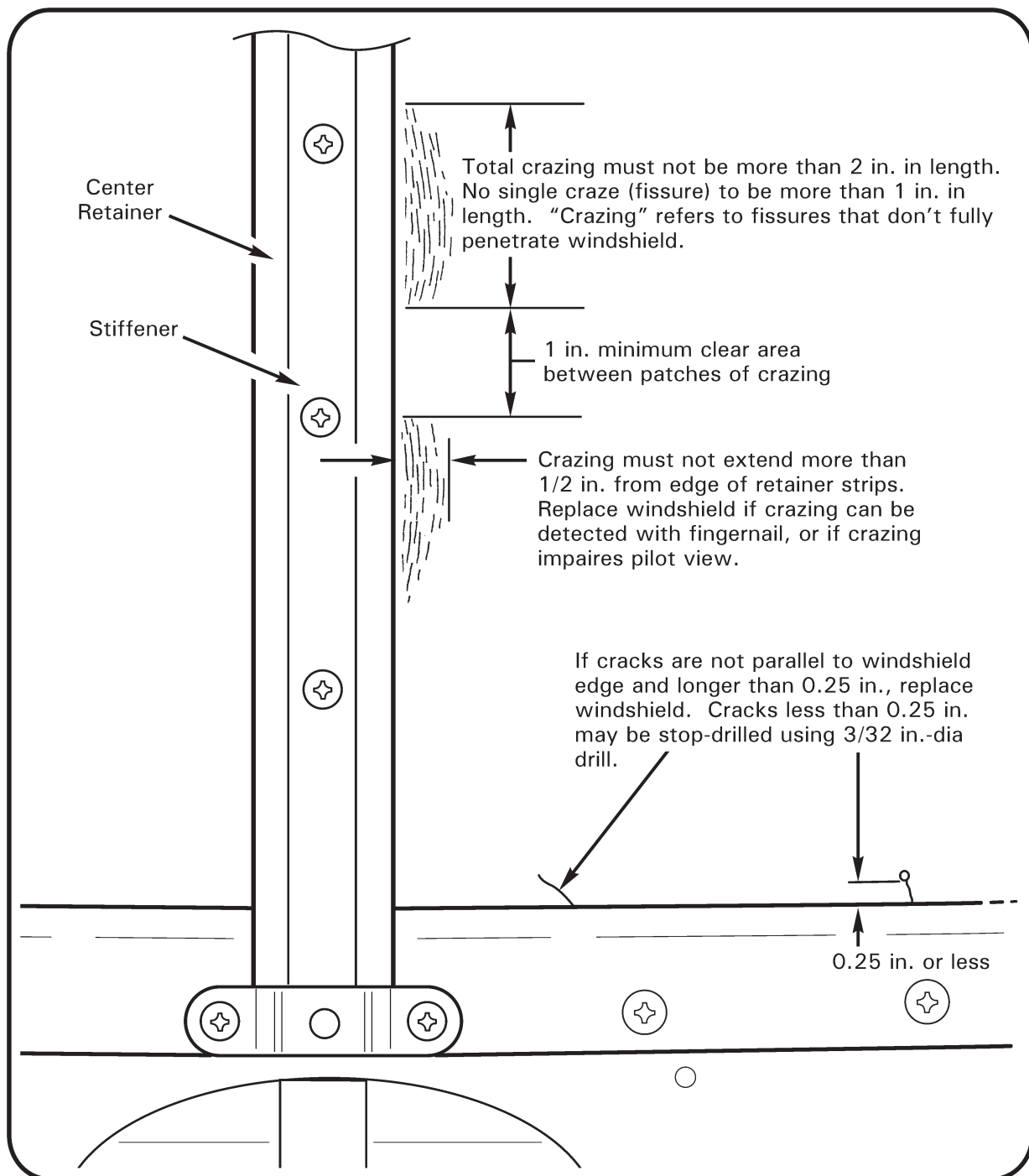


FIGURE 25-1 WINDSHIELD INSPECTION (ACRYLIC WINDSHIELD SHOWN)

25-20 Windshield Installation25-21 Standard (Acrylic) Windshield Installation**A. Description**

Acrylic windshields are sandwiched between thin aluminum retainers that are screwed to the door and windshield frames. An adhesive/sealant is applied between the retainers and the windshields for security and weatherproofing.

**B. Cleaning**

Refer to § 23-10 Part B for cleaning windshield.

**C. Inspection**

Inspect both windshields for cracks and crazing adjacent to retainers per Figure 25-1. If cracks exceed these limits, replace damaged windshield per § 25-21 Part F.

Minor defects or imperfections that do not impair pilot visibility or indicate impending structural failure are acceptable.

**D. Removal**

1. Remove door assembly per § 25-10 Part B. Remove hardware securing A228-1 (upper) hinge assembly to door frame and remove hinge.

**NOTE**

If windshield is to be reinstalled, prior to removal, tape protective paper or film to the inside and outside of the windshield to prevent damage.

2. Remove hardware securing A238-17 or A238-18 (side) retainer to door frame and remove retainer.
3. Install upper hinge assembly, and install door assemblies for cabin structure support with windshield removed.
4. Support windshield. With a second person inside cabin to remove nuts, latch doors. Remove hardware securing A238-16 (upper) retainer, B409-5 gusset, D805-3 restraint (if installed), B409-7 (lower) retainers, B295-1 clip with trim string, B410-3 stiffener, and B410-1 (center) retainer to cabin and remove parts. Remove windshield.
5. Remove sealant from cabin and parts.
6. If windshield is to be reinstalled, remove sealant from windshield.
7. Repeat steps to remove opposite-side windshield, as required.

25-21 Standard (Acrylic) Windshield Installation (continued)**E. Installation****NOTE**

Prior to installation, if not previously accomplished, tape protective paper or film to the inside and outside of the windshield to prevent damage.

1. Verify sealant has been removed from cabin, parts, and windshield.
2. Position windshield on helicopter and cleco retainers to frames.
3. Attach 1/2"-wide masking tape to windshield along edge of retainers to catch sealant squeeze-out during retainer installation.
4. Remove A238-17 or A238-18 (side) retainer and install A228-1 (upper) door hinge assembly. Install door assemblies for cabin structure support during windshield installation.
5. Remove B410-1 (center) retainer. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing center retainer, B410-3 stiffener, and B295-1 clip with trim string to cabin. Special torque screws per § 23-33. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
6. Remove B409-7 (lower) retainers. Run a bead of B270-26 sealant along entire edge of tape line. With a second person inside cabin to tighten nuts, latch doors. Install hardware securing lower retainers to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
7. Remove A238-16 (upper) retainer. Run a bead of B270-26 sealant along entire edge of tape line. With a second person inside cabin to tighten nuts, latch forward doors. Install hardware securing upper retainer and B409-5 gusset to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
8. Remove door and hinge assembly. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing side retainer and D805-3 restraint (if installed) to cabin. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
9. Reinstall hinge assembly, and install door assembly per § 25-10 Part C.
10. Ensure all fasteners are tight. Wipe off excess sealant with cheesecloth wet with lacolene.
11. Allow sealant to dry according to manufacturer's instruction.
12. Remove protective paper or film from inside and outside of the windshield.
13. Repeat steps to install opposite-side windshield, as required.

25-21 Standard (Acrylic) Windshield Installation (continued)**F. Replacement****NOTE**

Prior to installation, if not previously accomplished, tape protective paper or film to the inside and outside of the windshield to prevent damage.

1. Verify sealant has been removed from cabin and parts.
2. Cleco retainers to frames, checking for proper alignment. Remove retainers, except A238-17 or A238-18 (side) retainer.
3. Install A228-1 (upper) door hinge assembly, and install door assemblies for cabin structure support during windshield installation.
4. Lay out masking tape on frames to identify location for windshield edge (estimate edge where side retainer is clecoed to frame). Hold oversized windshield in place by hand and verify it overlaps masking tape on all frames and retainer. When satisfied with alignment, lay out masking tape on windshield for trimming.

**WARNING**

**Review appropriate Safety Data Sheet (SDS) when working in proximity to hazardous materials. Specific recommendations for use of personal protective equipment are located in the SDS.**

5. A band saw with a blade containing at least 24 teeth per inch is recommended for initial trimming. Tape cardboard to band saw table to prevent scratching of windshield. Trim windshield carefully to prevent binding of saw blade and cracking windshield. Finish initial cut using an orbital sander, as required.
6. Hold windshield in place and check for fit. Re-trim as necessary.
7. After windshield is fitted, use sanding block with 100-grit paper to smooth edges. Finish edge and bevel corners using a triangular machinist's scraping tool. Verify all edges are clean and free of notches.
8. Remove trimming debris from windshield and cabin.
9. Install windshield per § 25-21 Part E.

## 25-22 Impact-Resistant (Polycarbonate) Windshield Installation

### **A. Description**

The polycarbonate windshield installation is similar to the acrylic windshield installation, but the windshields fasten to the door and windshield frames via small stainless steel straps.

While polycarbonate has superior strength and flexibility properties when compared with acrylic, it is also more susceptible to ultraviolet (UV) degradation, and has a low scratch resistance. A hardcoat is applied during manufacturing to protect against UV damage and scratching, however, further effort must be made by the operator to maximize windshield service life. Follow instructions closely to avoid scratching windshield during cleaning (refer to § 23-10 Part B). Exposure to incompatible cleaning agents or solvents can result in embrittlement or crazing. Use a cabin cover when parking helicopter outdoors, or store helicopter in hanger when possible.

### **B. Cleaning**

Refer to § 23-10 Part B for cleaning windshield.

### **C. Inspection**

Inspect both windshields for cracks and crazing adjacent to retainers per Figure 25-1. Also inspect areas adjacent to fasteners and stainless steel straps for cracks and crazing. If cracks exceed these limits, replace damaged windshield per § 25-21 Part F.

Inspect windshields for any significant discoloration or cloudiness. Minor defects or imperfections that do not impair pilot visibility or indicate impending structural failure are acceptable.

Touch up perimeter paint using flat black (refer to § 23-77).

### **D. Removal**

1. Perform § 25-21 Part D steps 1 thru 3.
2. Support windshield. With a second person inside cabin to remove nuts and washers, latch doors. Remove hardware securing G367 ties and straps to windshield near center bow (all other hardware installed in windshield may remain in place during windshield removal).
3. Remove hardware securing A238-16 (upper) retainer, B409-5 gusset, D805-3 restraint (if installed), B409-7 (lower) retainers, B295-1 clip with trim string, B410-3 stiffener, and B410-1 retainer to cabin and remove parts. Remove windshield.
4. Remove sealant from cabin and parts.
5. If windshield is to be reinstalled, remove sealant from windshield but leave hardware and G367 ties, straps, pads, and tabs installed. If replacing windshield, remove hardware and G367 ties, straps, pads, and tabs, as required.
6. Repeat steps to remove opposite-side windshield, as required.



25-22 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**E. Installation****NOTE**

Prior to installation, if not previously accomplished, tape protective paper or film to the inside and outside of the windshield to prevent damage.

**NOTE**

Inspect condition of G367 ties, straps, pads, and tabs to be installed. Verify no obvious damage, deformation, or stretching. If windshield is being replaced due to bird strike or other impact which could deform ties, straps, pads, or tabs, replacement of these items is recommended.

**NOTE**

Refer to R22 Illustrated Parts Catalog Chapter 52. Note location of G367 ties, straps, pads, and tabs on work table or by marking on tape at fasteners to facilitate installation.

1. Verify sealant has been removed from cabin, parts, and windshield.
2. Position windshield on helicopter and cleco G367 ties, straps, tabs, and retainers to frames. Also, cleco G367 ties, straps, and tabs to windshield at center bow, if drilled.
3. Install A228-1 (upper) door hinge assembly. Install forward door assemblies for cabin structure support during windshield installation.
4. If windshield is drilled and has hardware, G367 ties, straps, pads, and tabs installed:
  - a. With a second person inside cabin to tighten nuts, latch forward doors. Remove clecoes and install hardware securing G367 ties and straps to windshield at center bow; special torque screws per § 23-33.
  - b. Attach 1/2"-wide masking tape to windshield along edge of retainers to catch sealant squeeze-out during retainer installation.
  - c. Remove B410-1 (center) retainer. Run a bead of B270-26 sealant along entire edge of tape line. Install hardware securing center retainer, B410-3 stiffener, and B295-1 clip with trim string to cabin; special torque screws per § 23-33. Remove tape and wipe off excess sealant with cheesecloth wet with lacolene.
  - d. Perform § 25-21 Part E steps 6 thru 13.

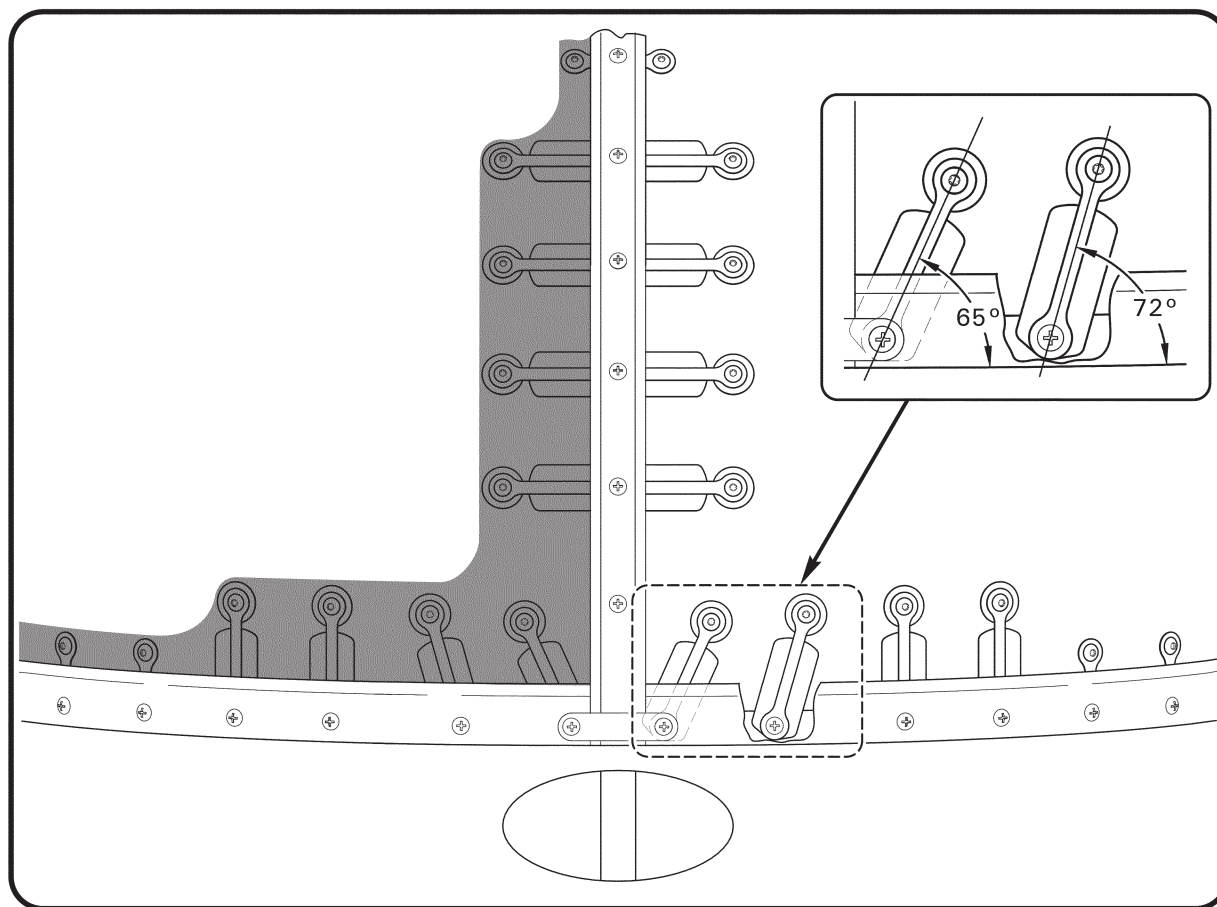


FIGURE 25-2 G367 TIES AND STRAPS INSTALLATION

## 25-22 Impact-Resistant (Polycarbonate) Windshield Installation (continued)

### E. Installation (continued)

5. Refer to Figure 25-2. Align G367 ties and straps perpendicular to retainers within  $2^\circ$ , except at locations shown. Install B410-3 stiffener and special torque screws per § 23-33. Match drill #40 pilot holes through windshield and install clecos.
6. At center bow:
  - a. Remove B410-3 stiffener and B410-1 (center) retainer. Remove G367 ties and straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Apply B270-26 sealant to G367 tabs and pads and position on windshield. Run a bead of B270-26 sealant along entire edge of windshield. Install hardware securing center retainer, B410-3 stiffener, and B295-1 clip with trim string to cabin. Special torque screws per § 23-33.
  - c. With a second person inside cabin to tighten nuts, latch doors and install hardware securing G367 ties and straps to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.

25-22 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**E. Installation (continued)**

7. At lower retainers:
  - a. Remove B409-7 (lower) retainers. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Apply B270-26 sealant to G367-12 tabs and position on windshield. Run a bead of B270-26 sealant along entire edge of windshield. With a second person inside cabin to tighten nuts, latch doors, and install hardware securing lower retainers to cabin. Install hardware securing G367 straps to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.
8. At upper retainer:
  - a. Remove A238-16 (upper) retainer. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Run a bead of B270-26 sealant along entire edge of windshield. With a second person inside cabin to tighten nuts, latch forward doors, and install hardware securing upper retainer and B409-5 gusset to cabin. Install hardware securing G367 straps and ties to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.
9. At door frame:
  - a. Remove door and hinge assembly. Remove G367 straps and expand pilot holes to 0.169–0.175 inch diameter holes thru windshield. Finish holes with reamer; deburr back side of holes using plastic razor. Clean up debris.
  - b. Run a bead of B270-26 sealant along entire edge of windshield. Install hardware securing side retainer and D805-3 restraint to cabin. Install hardware securing G367 straps and ties to windshield; special torque screws per § 23-33. Wipe off excess sealant with cheesecloth wet with lacolene.
10. Reinstall hinge assembly, and install door assembly per § 25-10 Part C.
11. Ensure all fasteners are tight. Wipe off excess sealant with cheesecloth wet with lacolene.
12. Allow sealant to dry according to manufacturer's instruction.
13. Remove protective paper or film from inside and outside of the windshield.
14. Repeat steps to install opposite-side windshield, as required.

25-22 Impact-Resistant (Polycarbonate) Windshield Installation (continued)**F. Replacement**

1. Perform § 25-21 Part F steps 1 thru 4.

**WARNING**

**Review appropriate Safety Data Sheet (SDS) when working in proximity to hazardous materials. Specific recommendations for use of personal protective equipment are located in the SDS.**

2. A band saw with 20°–30° clearance angle, 0–5° rake angle, 600–1000 m/min rotation speed, and 1.5–4 mm tooth spacing is recommended for initial trimming. Tape cardboard to band saw table to prevent scratching of windshield. Trim windshield carefully to prevent binding of saw blade and cracking windshield. Finish initial cut using an orbital sander, as required.
3. Hold windshield in place and check for fit. Re-trim as necessary.
4. After windshield is fitted, use sanding block with 100-grit paper to smooth edges. Verify all edges are clean and free of notches.
5. Remove trimming debris from windshield and cabin.
6. Install windshield per § 25-22 Part E.