The windows installed on Nova vehicles may be a one-piece fixed type, or may consist of an upper and lower section, separated by a transom.

The upper section of each window may be comprised of a fixed window, a tilting window, or a sliding window. The lower section may be comprised of a fixed window or a sliding window. Vehicles equipped with an air conditioning system are not available with lower sliding windows, but rather are supplied with fixed lower windows.

All windows installed on the vehicle essentially have the same structure. Whether the window has one piece sealed or has an upper section, and a bottom window, they each have a sub-assembly, and a clamp ring. Emergency exit windows have a sub-frame, in addition to the regular frame and clamp ring.

There are 13 windows along the two sides of the Nova LFS bus, which consist of:
- the driver’s window (A),
- seven panoramic windows, some of which serve as emergency exits (B),
- three large windows located at the rear of the vehicle (C)
- two small rear sealed windows (D)

See Figure 1 for the location of the windows on the vehicle. See Figure 4 for the different types of windows.
40' LOW FLOOR BUS (WITH T-DRIVE)

There are 12 windows along the two sides of this vehicle, which consist of:
• the driver’s window (A),
• seven panoramic windows, some of which serve as emergency exits (B),
• two large windows located at the rear of the vehicle (C),
• two large angled windows (E)

See Figure 2 for the location of the windows on the vehicle. See Figure 4 for the different types of windows.

ARTICULATED LOW FLOOR BUS

There are 17 windows along the two sides of this vehicle, which consist of:
• the driver’s window (A),
• nine panoramic windows, some of which serve as emergency exits (B),
• five large windows (C),
• two large angled windows at the rear of the vehicle (E)

See Figure 3 for the location of the windows on the vehicle. See Figure 4 for the different types of windows.

Figure 2 - Location of Side Windows on a 40' Nova LFS with T-Drive (typical)
Figure 3 - Location of Side Windows on an Articulated Nova LFS (typical)
REPLACEMENT OF WINDOW ASSEMBLIES

See Figure 5.

**NOTE:**
All window assemblies are removed and installed in basically the same way. Therefore, only the sliding sash window is illustrated in Figure 5 to serve as a typical model.

**WARNING:**
Always wear heavy gloves and safety glasses when handling glass.
To avoid accidents when removing or assembling windows, it is strongly recommended that you work with the help of at least one assistant.

REMOVAL

**WARNING:**
Before removing any window, ensure that there is sufficient support outside the vehicle to hold the window assembly.

1. Remove all screws that attach the assembly to the inside of the bus.
2. Remove the window assembly as carefully as possible while trying not to damage the seal.

INSTALLATION

**CAUTION:**
Before proceeding with the installation of a window, visually inspect the condition of the exterior contact surface that is used as a support point for the window’s rubber seal. Ensure that the exterior rubber seal is well seated in the frame.

1. Position the window on a cradle with the clamp ring installed. If installing a new window, drill the points of alignment A and B. See Figure 6.
2. Cut butyl cartridge tip in order to obtain an opening diameter of ¼ in. (6 mm). Apply butyl sealant all around the rubber seal to prevent moisture penetration. The sealant must be positioned on the inside surface of the seal.
Figure 5 - Sash Window Assembly (Sliding Sash Windows)
**CAUTION:**
The angled windows at the rear of a T-Drive vehicle and the driver's window require two beads of butyl on the four corners.

3. Place the window in the structure opening and center the window accordingly. To facilitate the installation, use a suction-grip handler.

**NOTE:**
The exterior rubber of the window can slip out of position very easily, especially when handling the window from the inside to the outside. Handle with care and make sure the rubber is in place before installing the window.

4. If necessary, place shims on each side of the window, under the rubber, in order to create a good even contact surface on all sides.

5. Align the clamp ring and the main frame. Install screws at the points of alignment A and B. Tighten the screws completely. See Figure 6.

**NOTE:**
When tightening the screws, ensure the window has a good contact with the contour of the bus, in order to obtain a good seal.

**NOTE:**
When tightening the screws, apply an antiseize compound to all the screws.

6. Install screws 3 to 6, respecting the installation sequence of the screws. See Figure 6. Tighten the screws completely. See Figure 6. If a suction-grip was used, if may now be removed.

7. Install screws 7 to 12, respecting the installation sequence of the screws. See Figure 6. Tighten the screws completely.

8. If need be, execute the preceding steps on the other windows being installed.

9. Install the remaining screws on all new windows, respecting the installation sequence of the screws. See Figure 6. Tighten the screws completely.

10. Following installation, verify that the emergency release handle works correctly on those windows serving as emergency exits. See the heading VERIFICATIONS at the end of this section.

**REMOVAL OF WINDOW ASSEMBLY FROM SUBFRAME ASSEMBLY**

**NOTE:**
This section applies only to emergency windows.

See Figure 7.

1. Remove hinge retaining screws, hinge end caps, hinge retainers, and hinge screw cover.

2. Activate the emergency exit handle.

3. While supporting both ends of the frame, tilt the mainframe outwards to an angle of approximately 40°, disengaging the male hinge from the female hinge.

**INSTALLATION OF WINDOW ASSEMBLY INTO SUBFRAME ASSEMBLY**

**NOTE:**
This section applies only to emergency windows

See Figure 7.

1. While supporting both ends of the frame, tilt the bottom of the frame outwards to an angle of approximately 30°, and re-install the male hinge (7), into the female hinge (8), making sure that the hinges are properly engaged.

2. Center the mainframe within the subframe and re-install the hinge screw cover (4), hinge retainers (3), hinge end caps (2), and retaining screws (1).
REPLACEMENT OF SASHES

NOTE:
These procedures are not necessary when changing sash glazing only.

SLIDING SASHES

NOTE:
The following procedure does not apply to vehicles equipped with air-conditioning. Lower sliding sashes are not installed on these vehicles.

REMOVAL

See Figure 8.
1. If the sash is equipped with a mullion, remove mullion screws (1), the mullion (2) and the mullion end caps (3).
2. Remove the sash stops (4).
3. Remove the transom insert screws (5).
4. Slide both sashes toward the center of the mainframe.
5. Supporting both sashes, slide out the transom insert from under the transom and remove the sash together with the insert. See Figure 9.
INSTALLATION

See Figure 8.
1. Remove any old sealant from around the transom screw holes (5) and apply a small amount of Sikaflex around the screw holes.
2. Place the rear of the sash onto the inside track of the mainframe and the front of the sash onto the outside track of the mainframe.
3. Locate both sashes in the center of the mainframe tilted slightly to the inside at the top.
4. Place the transom insert on the top of the sash assemblies (see Figure 8) and seat them into place, making sure that the transom insert holes (5) are lined up with the transom holes.
5. Install the screws.
6. Install the mullion (2), if applicable.

REPLACEMENT OF GLAZING

REMOVAL

NOTE:
The following procedure applies to all window assemblies, regardless of their type.
1. Remove the interior glazing spline by pulling it away from the frame and continuing around the entire perimeter of the glass.
2. Remove any damaged glass from the frame.
3. Prior to installing new glazing, check the interior glazing spline for tears. If the spline is torn or split, repair the joint with cyanoacrylate adhesive.

UPPER TILTING SASH

REMOVAL

See Figure 10.
1. Remove screws (1) from transom and lift out sash stop (2).
2. Open up the tilting sash and remove the screws (3) connecting the sash to the cylinder mounts (4).
3. Remove sash assembly from the window frame.

INSTALLATION

See Figure 10 and 11.
1. Place tilting sash into the window frame and re-connect the sash and cylinder mounts (4).
2. Close the sash.
3. Re-install sash stop (2) and screws (3).

LOWER-FIXED GLAZING

See Figure 12.
1. Install new glass in place against the outer glazing spline.
2. Notch the outer portion of mitered corners (detail A)
3. Spray glass cleaner onto the inner surface of the glazing spline and install into corner.
4. Work the spline into the channel and move downwards around the bottom corner.
5. Install the spline into the opposite upper corner and work it down and around the lower corner.
6. Install the upper section of the spline in the center and work it into place towards each upper corner.
7. Install the lower section of the spline in the center and work it into place towards each lower corner.
UPPER FIXED GLAZING

See Figure 13.
1. Install new glass in place against the outer glazing spline.
2. Notch the outer portion of mitered corners (detail A).
3. Spray glass cleaner on to the inner surface of the glazing spline and install into CORNER 1.
4. Work the spline into the channel and move upwards around the top corner.
5. Install the spline into the opposite lower corner and work it up and around the upper corner.
6. Install the lower section of the spline in the center and work it into place towards each lower corner.
7. Install the upper section of the spline in the center and work it into place towards each upper corner.

FIXED GLAZING IN SEALED WINDOWS

See Figure 14.
1. Install new glass in place against the outer glazing spline.
2. Locate joint of the spline assembly.
3. Spray glass cleaner onto the inner surface of the glazing spline and install the spline joint location at the bottom of the frame in the center.
4. Work the spline into place towards each lower corner.
5. On the right side, (from the interior) continue installing the spline up and around the upper corner.
6. On the left side, install the spline up and around the upper corner.
7. Install the spline in the center of the top section of the frame and work it towards the upper corners.

UPPER TILTING SASH GLAZING

See Figure 15.
1. Install new glass in place against the outer glazing spline.
2. Notch outer portion of mitered corners (detail A) and make 5 cuts on the outer portion of the spline ½ in. (13 mm) apart, (detail B).
3. Spray glass cleaner onto the inner surface of the glazing spline and install into corner 1.
4. Work the spline into the channel and move upwards around the top corner.
5. Install the spline into the opposite lower corner and work it up and around the upper corner.
6. Install the lower section of the spline in the center and work it into place towards each square corner.
7. Install the upper section of the spline in the center and work it into place towards each rounded corner.
LOWER SLIDER GLAZING

**NOTE:**
The following procedure does not apply to vehicles equipped with air-conditioning. Lower slider windows are not installed on these types of buses.

See Figure 16.

1. Install new glass in place against the outer glazing spline.
2. Notch the outer portion of mitered corners (detail A) and make 5 cuts (detail B), on the outer portion of the spline approximately ½ in. (13 mm) apart.
3. Spray glass cleaner on to the inner surface of the glazing spline and install into the corners.
4. Install the upper section of the spline into the center and work towards each corner.
5. Install the straight side of the spline into the center and work it toward each corner.
6. Install the remaining section of spline into the radius corner and work the spline back into the corners, going toward each corner.

### VERIFICATIONS

**CAUTION:**
The results of the following verification are based on the characteristics of new components. Your results may vary. Also, note that any local and federal government requirements must be complied with.

### CLOSING AND OPENING THE EMERGENCY WINDOW

1. Check to see that the three emergency release strikes have a light coating of lithium-based white grease applied to the top surface.
2. While supporting the bottom of the window assembly in the center, open it outwards at an angle of approximately 60° and release. The momentum of the window is normally sufficient to cause the window to shut.

### WINDOW LOCK TENSION TEST

See Figure 17.

Use a tensiometer, set to PULL, and a device suitable for pulling the emergency handle. The results obtained should be less than 26 lbf (116 N) for the first inch (25 mm) and 13 lbf (58 N) for the remainder. If not, inform the quality officer or the quality department.

**NOTE:**
Always keep the tool at right angles to the handle.

### EMERGENCY RELEASE HANDLE TEST

See Figure 18.

Use a tensiometer, set to PULL, and a device suitable for pulling the emergency handle. The results obtained should be less than 20 lbf (89 N). If the results are greater than this figure, then the handle does not conform to requirements.

**NOTE:**
Always keep the tool at right angles to the handle. Ensure that the cable is attached to the highest point on the handle.
EMERGENCY HANDLE REPLACEMENT

See Figure 19.

In the unlikely event that an emergency handle fails the foregoing tests and requires replacement:
1. Remove the two screws holding the emergency release handle to the frame.
2. Remove the handle.
3. Remove the cable from the emergency release bar.
4. Reinstall the replacement assembly.

EMERGENCY WINDOW TEST

See Figure 20.

Use a tensiometer set to pull, and a device suitable for pushing the emergency window at the lower-center location. The results obtained should be less than 60 lbf (267 N). If the results are greater than this figure, then the window does not conform to requirements.

NOTE:
Always keep the tool at right angles to the window.
PREVENTIVE MAINTENANCE

PREVENTING CORROSION

Corrosion of certain window components can occur as a result of environmental conditions. Taking the following steps may prevent the accumulation of corrosion:

1. Clean and dry the exterior surface of the window to be treated. The joining edge of the window and the rubber joint should be especially well cleaned, then dried.
2. Apply a thin coating of Sika205 sealant over the rubber joint. See Figure 21. Let this sealer dry for 10 minutes.
3. If all the windows on the same side of the bus are to be treated, perform steps 1 and 2 at the same time, then the drying time between steps will be ideal.
4. Using the application tool, which comes with the sealant, apply a bead of approx. 0.1 in. (3 mm) of Dolphin sealant in the joint, so that the sealing material covers the joint between the rubber seal and the window.

NOTE:
Check the expiry date on these products, since the shelf life of certain products will affect the efficiency of the maintenance.

5. When sealing the exterior of the window, add 2 spots of sealant in the joints between the horizontal bar of the window and the frame of the window. See Figure 22.
6. To complete the job and give it a clean appearance, a tool such as a trowel may be used to touch up the surface of the sealant.
7. If you are sealing all of the windows, perform steps 1 through 4 only, for the interior.
8. A drying time of 60 minutes is recommended before the bus returns to service.

SPRING LOADED RELEASE LATCHES ON EMERGENCY WINDOWS

1. Activate the emergency release system by pulling the emergency release handle and pushing out on the window. Secure in the open position.
2. With a stiff brush, loosen and remove excessive buildup (i.e. road salt, dirt, etc.) on the emergency release bar, latches, return spring, and strikes.
3. Push, pull and hold the emergency release handle and brush the sections of the emergency release bar previously hidden by the frame locator blocks.
4. Blow out any loosened build up from all emergency release system components and subframe with compressed air.
5. Activate the plastic plunger of the emergency release latches several times by hand. If the plunger does not move freely, flush the plunger with a penetrating oil spray (or alcohol-based silicone spray). Repeat if necessary. Do not lubricate latches with grease.
6. Apply a light coating of lithium-based grease to the top surface of the latch strikes.
7. Liberally apply Spray ’n Slide to lubricate the subframe surface in contact with the mainframe rubber seal and lubricate the rubber seal of the mainframe.
8. Apply the lubricant to the sides and bottom of the subframe and rubber seal.
9. Push, pull and release the emergency release handle two or three times to ensure that the system is operating properly.
10. Close the window, ensuring all latches are properly engaged.
11. This preventive maintenance procedure should be performed every 6,000 miles (10,000 km) to ensure consistent performance.
# Troubleshooting Guide

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
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| Emergency window does not close properly | a. Ensure that the window is centered in the frame.  
b. Ensure that the female hinge is assembled parallel to the frame. |
| Striker plates out of alignment       | a. Open the sash.  
b. Ensure the striker plate is tight enough so it can still be adjusted by hand.  
c. Close the sash and move the striker plate so it is tight up against the latch and parallel to it.  
d. Open the sash and tighten the screws on the striker plate. |
| Light scratches on window frame    | a. Use touch-up paint.                                                   |
| Deep scratches/gouges on window frame | a. Replace window frame, if necessary.                                   |

*Table 1 - Troubleshooting Guide*
GENERAL DESCRIPTION

VandalShield is a thin clear and distortion-free plastic film supplied with adhesive, creating very strong bonds to glass. Its main purpose is to prevent etching, scratches and graffiti on glass.

The easy removal of the plastic film keeps the maintenance costs low compared to windows or glass replacement. Also, its high adhesion on glass helps to prevent broken glass falling on customers during violent impact on the glass. Also, its strong adhesion to glass helps to reduce the risk of injuries to employees during the replacement of windows with broken glass.

INSTALLATION

Clean the glass surface with a paper towel and the application solution mixed with distilled water.

NOTE:

Application Solution: Graffiti Removal, Inc. has a water additive that, when used as directed with distilled water, will act as a slipping agent during installation. This solution has been found to produce an optically clear result.

Using another surfactant may result in a foggy appearance because of a soapy residue between the VandalShield and the glass.

For the installation or replacement of VandalShield film refer to VANDALSHIELD INSTALLATION MANUAL.

NOTE:

Do not try to remove from or install the plastic film on the glass if the ambient temperature is below 54°F (12°C).