

**DRAFT**  
**Repair of Laminated Automotive Glass Standard (ROLAGS)**

## **1.0 Introduction**

- 1.1 Windshield Repair is a permanent process that can be used to repair laminated auto glass that has been damaged.
- 1.2 There are two basic causes for damaged laminated auto glass.
  - 1.2.1 Impact: This is the most common and occurs when an object strikes the windshield.
  - 1.2.2 Stress or Twist: A crack occurs when a windshield is twisted, either by flexing within the vehicle frame or because of improper mounting.
- 1.3 The introduction of chemicals and equipment in 1972 that were specifically designed to repair damage on laminated windshields has led to the subsequent development of sophisticated tools and superior resins. This in turn has enabled windshield repair to achieve the following, if performed by a trained professional.
  - 1.3.1 Improve the optical clarity by reducing the visible damage
  - 1.3.2 Re-create a smooth surface to prevent interference with the wipers
  - 1.3.3 Prevent the original damage from spreading further
  - 1.3.4 Add strength to the damaged area
  - 1.3.5 Retain the original seal by saving the windshield

## **2.0 Purpose**

- 2.1 It is the intention of the Repair of Laminated Automotive Glass Standards Committee (ROLAGS) that this document:
  - 2.1.1 Be used to consistently evaluate damages on laminated auto glass in order to aid in the decision to repair or replace the glass
  - 2.1.2 Assist the public in understanding what is achieved through windshield repair
  - 2.1.3 Encourage technicians to strive for the highest quality repair by following industry recommended procedures
  - 2.1.4 Codify the current best practices of laminated auto glass repair

## **3.0 Scope**

- 3.1 The Scope of this document shall be to define:
  - 3.1.1 Repairable damages
  - 3.1.2 The process of windshield repair
  - 3.1.3 The performance criteria for repaired glass

3.2 This document also provides best practices for the training of a repair technician.

#### 4.0 Glossary of Repair Terminology

4.1 **Bullseye:** Damage that is marked by a separated cone in the outer layer of glass that results in a dark circle with an impact point



BULL'S-EYE

4.2 **Chip:** Damage to the surface of the glass not associated with other types of damage

4.3 **Combination break:** Damage with multiple characteristics, i.e. star within a bullseye



COMBINATION

4.4 **Crack:** Single line of separation such as:

4.4.1 Short crack: A crack of 6 inches (150 mm) or less

4.4.2 Long crack: A crack of more than 6 inches (150 mm)

4.4.3 Edge crack: Any crack that that extends to an edge

4.4.4 Floating crack: Any crack that does not extend to an edge

4.4.5 Stress crack: Any crack that extends from an edge and lacks an impact point

4.5 **Damage:** A break in laminated glass

4.6 **Ding:** Non-technical term used to refer to a damage on laminated glass

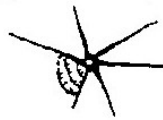
4.7 **Halfmoon:** Partial bullseye



HALF MOON

4.8 **Impact Point:** Actual location on the glass that was struck by an object (usually a stone) and resulting in damage

- 4.9 **Laminated glass:** Two or more layers of glass with a non-glass inner layer(s)
- 4.10 **Legs:** Short cracks that emanate from the break
- 4.11 **Pit:** Impact point from which a small piece of glass is missing
- 4.12 **Repair:** A process that removes air from a break in laminated glass and fills the break with a curable, optically matched resin
- 4.13 **Star Break:** Damage that exhibits a series of short cracks or legs that emanate from the impact point

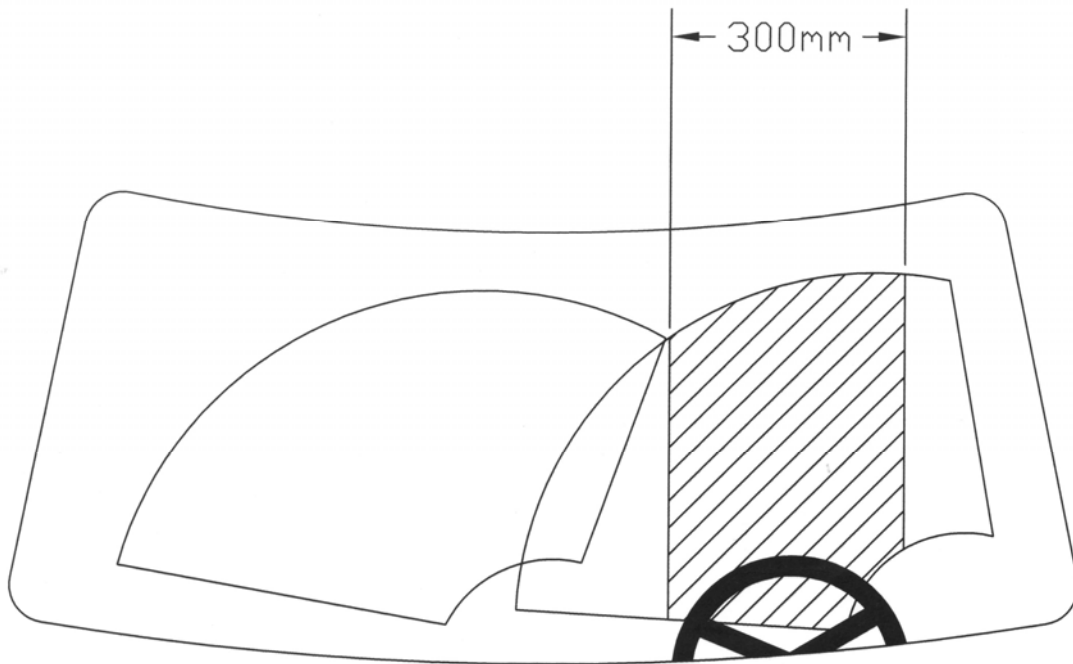


**STAR BREAK**

- 4.14 **Stone Break:** Non-technical term often used to refer to damage on laminated glass.
- 4.15 **Surface Pit:** Damage to the surface of laminated glass that is not associated with other types of damage

## 5.0 Glossary: Other related terminology.

- 5.1 **Driver's Primary Viewing Area (DPVA):** An area on the exterior of the windshield:
  - 5.1.1 12 inches wide (300 mm wide),
  - 5.1.2 Centered on the driver's position,
  - 5.1.3 Extends from the top to the bottom of the wiper sweep. (1in.=25 mm)



- 5.2 **Cosmetic blemish:** A non-structural defect within the completed repair that does not impair the driver's vision
- 5.3 **Refraction:** The bending of light rays while passing from one medium to another
- 5.4 **Resin:** An organic material optically matched to the glass that when cured will fill the break or crack in the laminated glass
- 5.5 **Wiper Sweep:** An area on the windshield cleaned by a motorized arm with a flexible blade attached
- 5.6 **Value added features:** Items added to the windshield by the manufacturer such as rain sensors, heads-up displays (HUD), Night Vision, Global Positioning Systems (GPS) antennas, etc.

## 6.0 Damage Types and Repairable Dimensions

- 6.1 **Bullseye:** With a diameter no larger than one inch (25 mm)
- 6.2 **Combination break:** With neither break having a measurement greater than 3 3/8 inches x 2 1/8 inches (84 mm x 53 mm)
- 6.3 **Crack:** No longer than 18 inches (450 mm)
- 6.4 **Half moon (Partial Bullseye):** with a diameter no larger than one inch (25 mm)

- 6.5 **Star break:** with a damage no larger than 3 3/8 inches x 2 1/8 inches (84 mm x 53 mm)

**Note:** 3 3/8 X 2 1/8 inches (84 mm x 53 mm) is approximately the size of a credit card.

(See 6.2 and 6.5 above)

**Note:** One inch (25 mm) is approximately the size of USA 25 cent coin

## 7.0 Repair Limitations

Both the location and the condition of the damage are important considerations in the decision to repair. Replacement is recommended under any of the following circumstances, i.e. do not repair:

- 7.1 Damage that penetrates both the inside and outside layer of a laminated glass
- 7.2 Damage with three or more long cracks emanating from a single impact point
- 7.3 Damage on the inside layer of laminated glass
- 7.4 Damage that is contaminated with visible impurities that cannot be removed through cleaning
- 7.5 Damage in an area of the windshield where value-added features (see section 5.6) may be negatively affected by the damage and/or the repair process
  - 7.5.1 Repair technicians should consult and follow any vehicle manufacturer's recommendations before performing a repair on any value-added feature.
- 7.6 Damage with a pit size greater than 3/8 inch (9 mm)
- 7.7 Edge crack(s) that intersect more than one edge
- 7.8 Stress cracks
- 7.9 In the Driver's Primary Viewing Area (DPVA) if:
  - 7.9.1 Any damage being considered for repair has a diameter larger than one inch (25 mm)
  - 7.9.2 The finished pit will be greater than 3/16 inch (5 mm)
  - 7.9.3 The repair will be within 4 inches (100 mm) of another repair
- 7.10 If in the technician's judgment *any* repair will impair the safety of the driver and or the occupant of the vehicle.

Note: One inch (25 mm) is approximately the size of a US 25 cent coin.

## 8.0 Procedures to be followed by the repair technician.

- 8.1 Auto glass repair is a process that removes the air from the break and fills the break with a curable, optically matched resin.
- 8.2 In order to insure the best possible repair, the technician should do the following:

- 8.2.1 Inspect the damage from both the inside and outside to determine if the damage is repairable (See Sections 6.0 & 7.0).
- 8.2.2 Check for moisture and/or contamination.
- 8.2.3 Remove dirt, foreign matter and loose glass from the damaged area.
- 8.2.4 In cases of temperature extremes, cool or warm the glass accordingly.
- 8.2.5 Access the damage through probing or drilling.
- 8.2.6 Protect the resin from premature curing.
- 8.2.7 Remove the air and inject repair resin.
- 8.2.8 Properly cure the resin.
- 8.2.9 Fill the pit with resin.
- 8.2.10 Properly cure the resin.
- 8.2.11 Finish the repair to be flush with the glass.
- 8.2.12 Inspect the finished repair (see 9.0).

## **9.0 Quality Inspection of the Finished Repair by the Technician**

- 9.1 The repair shall be inspected from the driver's position within the vehicle.
- 9.2 The repair should be free of significant light scatter, dirt, road contaminants, air pockets, and other optical defects that may distract the driver or impair his vision.
- 9.3 The finished pit should not be larger than 3/8 inch (9 mm) and is limited to 3/16 inch (5 mm) in the Driver's Primary Viewing Area (DPVA).
- 9.4 The repair should not interfere with the operation of the windshield wipers.

## **10.0 Training of a Repair Technician**

- 10.1 The technician shall be trained to this Standard.
- 10.2 Said training program shall include:
  - 10.2.1 Both active (hands-on) and passive coursework
  - 10.2.2 Passage of both a written and practical exam
  - 10.2.3 Adequate maintenance of records on all participants and their final exam scores

## **11.0 Performance Requirements for Windshield Repair**

Windshield repair is a permanent process that removes air from the break and fills it with a curable, optically matched resin. To accomplish this, it is recommended that a windshield repair system include the following:

- 11.1 Procedures to:
  - 11.1.1 Inspect the damage and apply repair criteria
  - 11.1.2 Check for moisture and/or contamination
  - 11.1.3 Ensure that the break is filled
- 11.2 Equipment to:
  - 11.2.1 Remove moisture/contamination
  - 11.2.2 Access damage
  - 11.2.3 Remove air and inject the repair resin
  - 11.2.4 Properly cure the resin

11.2.5 Fill the pit

11.3 Resins that will:

11.3.1 Meet the requirements such as viscosity, cure rate, and ability to be polished which are specific to the windshield repair system's equipment

11.3.2 In its cured state, match the refractive index, color and clarity of the laminated glass that is being repaired

11.3.3 In a long crack repair remain free of light refraction and seal the laminate for the life of the long crack repair warranty

11.4 Suppliers of laminated automotive glass repair systems shall be required to pass the following tests:

Test pieces of categories (11.5.1) and (11.5.2) will be subjected to ANSI Z 26.1-1996 tests prescribed for laminated glass used in windshields:

11.4.1 Test 1, Light stability test

11.4.2 Test 2, Luminous transmittance test

11.4.3 Test 3, Humidity test

11.4.4 Test 4, Boil test

11.4.5 Test 9, Impact dart test, 9.14 m (30 ft)

11.4.6 Test 12, Impact, ball, 9.14 m (30 ft)

11.4.7 Test 26, Penetration resistance

11.5 Test pieces: AS-1 laminated glass of 6 mm nominal thickness prepared as follows:

11.5.1 12 inch x 12 inch (300 mm x 300 mm) with a repaired combination break of 0.6-1.0 inch (15-25 mm) diameter at the geometric center

11.5.2 12 inch x 12 inch (300 mm x 300 mm) with two opposite edges arched and polished, with a repaired crack bisecting the finished edges, (i.e. 12 inches [300 mm] long)