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**AUTOMOTIVE  
GLASS**

**Windshield Repair  
Guidelines**

- Background
- Limitations of Repairs
  - Guidelines
- Damage Assessment
  - When not to repair
  - Repair Limits
- Repair Procedures
- Quality Assessment
- Definition of Repair Areas
- Disclaimer

## Background

Glazing manufacturers take extensive steps to ensure that the glazings they produce meet the highest standards for quality and safety. The windshields that leave their factories must meet all statutory national and international glazing requirements, such as United Nations Economic Commission for Europe ECE R43, or United States Federal Motor Vehicle Safety Standard 205. To signify that the parts have been made in compliance with these safety standards, they mark their glass with the official approval marking and the windshield manufacturers logo.

Recently there has been a growing trend to repair, rather than replace, windshields, in the event of damage from stones or other small objects. Repair is an established practice and it makes economic sense in many cases, indeed in some circumstances insurance companies now require aftermarket glass fitters to repair a minimum percentage of damaged windshields.

Bearing in mind that repair does **not** fully restore the strength and other features of a windshield to a state equal to that of an intact, undamaged windshield, GEVPV has prepared these guidelines to repairers to determine (i) when such repair is in no way possible and (ii) when, but subject to repairers' assessment, it may be possible.

### **Limitations of windshield repairs**

Windshield repair is mainly a cosmetic improvement that improves the appearance of the damaged area and its optical quality. It restores a smooth surface to damaged areas that may otherwise interfere with windshield wipers. It prevents further deterioration caused by moisture ingress.

Because repair does **not** fully restore the strength and other features of a windshield to a state equal to that of an intact, undamaged windshield and as the extent to which this is achieved depends on the quality of the materials and workmanship applied, GEPVP would always recommend replacing a damaged windshield rather than repairing it.

## **Repair Guidelines**

It is important to ensure that the repair process delivers to the customer a product which meets all safety standards and maintains fitness for purpose. Recognizing this, glazing manufacturers have worked with other interested parties to agree codes of practice which provide guidelines to help achieve this.

Typically guidelines cover:

- The type and size of a damage which may be repaired,
- The effects of environmental factors that may have contaminated the area to be repaired,
- The areas of a windshield in which a repair may be made,
- The procedures to be followed by the repairer,
- The assessment of the quality of the completed repair
- Marking of the repaired windshield
- Records to be completed and retained by the repairer.
- Training and certification of the repairer by the repair system manufacturer.

The following sections, whilst not intended to substitute existing codes of practice and regulation, provide a general guideline for the repair process. These guidelines cover all glass/PVB/glass windshield laminates.

## Damage Assessment

Sketches of the primary types of damage which may be repaired are shown below and include:

- The circular break called the bulls-eye. Picture
- The star break which has small cracks extending out in all directions. Picture
- Breaks which are combinations of the two, and go by various names. Picture



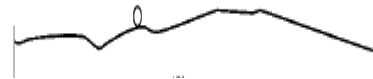
*Bulls-Eye*



*Star Break*



*Combination*



*Long Crack*

### **When not to repair**

GEPVP recommends that in certain cases, including but not limited to the following, damage must **not** be repaired:

- If the damage is in the critical wiped area ahead of the driver's eye line (Zone A.)
- Long cracks must not be repaired.
- Any damage with cracks through to the polyvinyl butyral interlayer allows moisture penetration which lowers the adhesion between glass and interlayer. Therefore, damage of this type older than two weeks should be carefully assessed. Any damage with visible de-lamination must not be repaired.
- Whitening of the polyvinyl butyral interlayer in the area of the damage indicates that substantial moisture penetration has taken place, with irreversible adhesion loss, and the windshield must not be repaired, even if drying removes the whitening.
- On windshields incorporating reflective metallic film solar control technology, moisture penetration will very quickly induce corrosion in the metallic reflective layer. Any damage with visible de-lamination or discoloration around the crack must not be repaired.
- Windshield damage typically has a crater at the point of impact with a wider area of surrounding damage. Damage to any portion of the windshield with an impact crater greater than 5mm diameter shall not be repaired.
- Cracks extending to an edge must not be repaired if the damage to be repaired is inaccessible underneath an edge moulding or glazing gasket.
- Any damage to the glass on the inside of the windshield must not be repaired.
- Damage to the heated area of windshields having a heated wiper rest area. Damage is repairable if it has not penetrated to the interlayer.
- Damage to fully heated windshields. Damage is repairable if it has not penetrated to the interlayer.
- Two repairs must not be done less than 100 mm apart.

**Windshield replacement is required in all cases where repair is not possible**

## Repair limits

Referring to **Damage Assessment** for break type and **Definition of repair areas** for windshield zone definition

	Repairer may decide to repair if:	Repairer may decide to repair if:	Must <b>not</b> be repaired
	In the wiped area outside zone A, damage <= 15 mm diameter.	In the non-wiped area damage <= 40mm.	
Bulls eye break	<input type="checkbox"/>	<input type="checkbox"/>	
Star break	<input type="checkbox"/>	<input type="checkbox"/>	
Combination break	<input type="checkbox"/>	<input type="checkbox"/>	
Damage in the wiped area ahead of the driver's eye line (Zone A)			<b>X*</b>
Long crack			<b>X</b>
Visible delamination			<b>X</b>
Interlayer whitening			<b>X</b>
Visible corrosion			<b>X</b>
Impact crater > 5mm			<b>X</b>
Cracks extending underneath an edge moulding			<b>X</b>
Cracks in the inner glass			<b>X</b>
Damage < 100mm apart			<b>X</b>

**\* Depending on local legislation/roadworthiness test**

## **Repair Procedures**

- Repair must only be performed by qualified personnel who have been trained and certified in the use of the repair system.
- The repair systems used must have performance equivalent to or exceeding that which is defined within BS AU 251:1994 and AS/NZS 2366.2:1999.
- Dirt and foreign matter must be completely removed from the damaged area before repairing.
- Drilling the glass is strongly not recommended because it can lead to interlayer penetration.
- Any moisture in the damaged area must be removed with a hot air dryer prior to repair.
- Repairs should be carried out at a temperature consistent with the repair system instructions. In the absence of instructions, the ambient temperature should be 20 – 30°C.
- Avoid overheating the glass, which may melt the interlayer or force out the resin and cause cracks to reappear upon cooling.

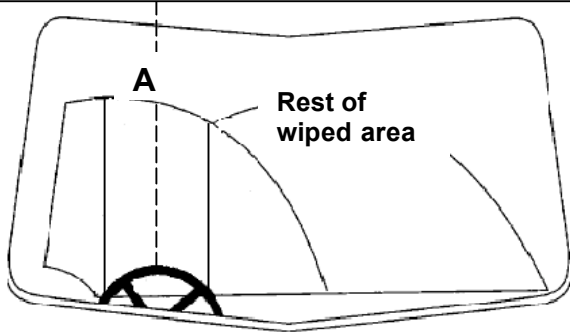
### **Quality Assessment**

- There must be no significant optical defects in the repaired areas.
- Visual inspection should be carried out from the inside of the vehicle, under good illumination and from a distance of 230 mm with the unaided eye.
- The repaired areas should be free of voids, air bubbles or foreign materials.
- If a small dull spot is visible after repair, it must not exceed 5mm diameter.
- The repair must not cause streaking or otherwise affect the windshield wiper function.

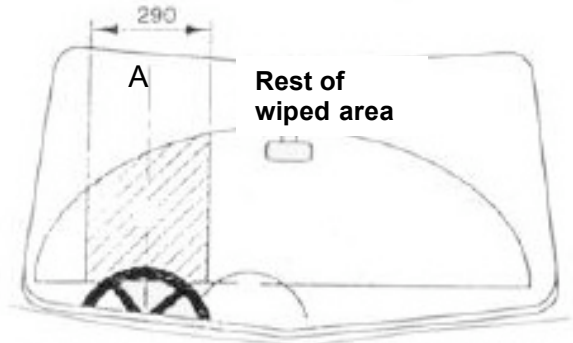
**Definition of repair areas**

For passenger cars, Zone A is 290 mm wide, centred on a longitudinal plane centred on the steering wheel and bounded at top and bottom by the field scribed by the windshield wipers

**Non Wiped Area**

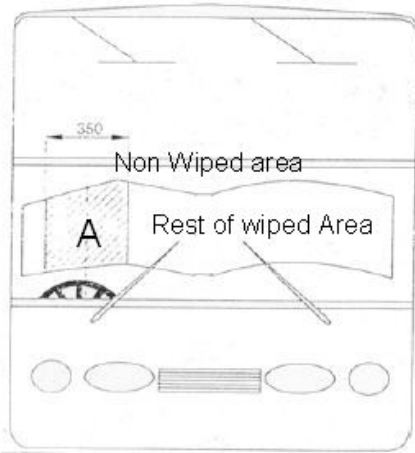


Passenger Car with Twin Wiper



PASSENGER CAR WITH SINGLE WIPER

For Heavy Goods vehicles and coaches, zone A is a 350mm wide, centred on a longitudinal vertical plane centred on the steering wheel and bounded at top and bottom by the field scribed by the windshield wipers



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## **Disclaimer**

This guideline is only indicative and is not binding upon the GEPVP and/or its individual members.

The GEPVP and/or its individual members are neither responsible for any breach whatsoever of this guideline nor for any damage made by a repairer whether the latter has or has not followed this guideline.