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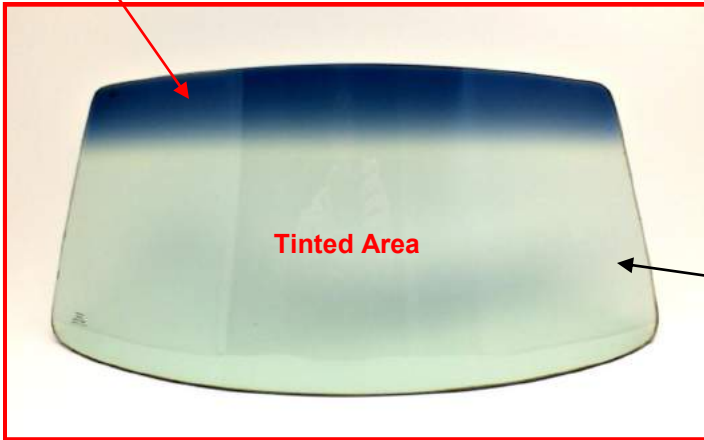
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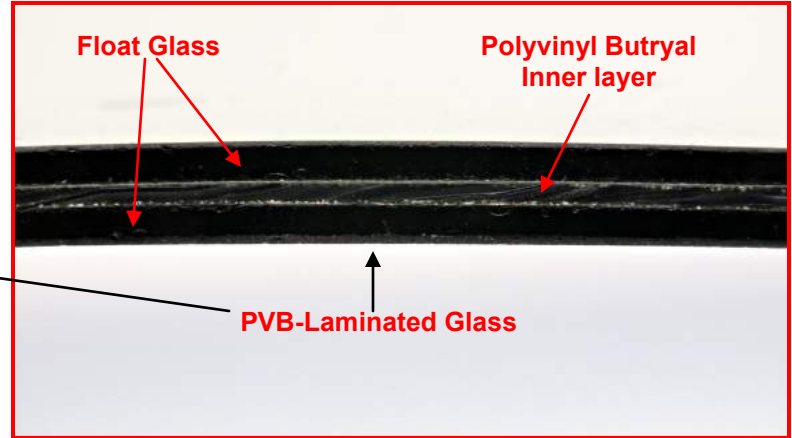
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Anatomy of a Windshield - When to Repair or Drill

Shaded Area



Cross Section of a Windshield



A windshield consist of layers...

Laminated glass, used in the automotive windshields, is comprised of a protective interlayer of polyvinyl butyral bonded between two panels of glass. The bonding process takes place under heat and pressure. The PVB interlayer is optically clear and binds the two panes of glass together. Once sealed together, the glass "sandwich" (i.e., laminate) behaves as a single unit and looks like normal glass. The polymer interlayer of PVB is tough and flexible, so cracks do not pass from one layer of the glass to the other.

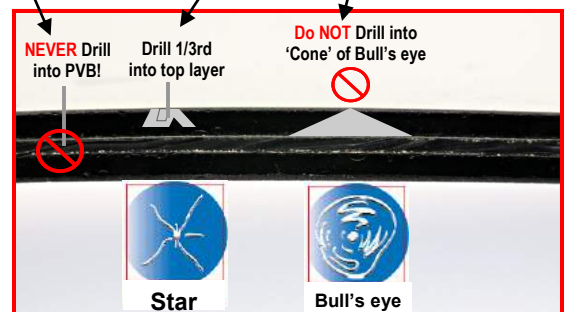
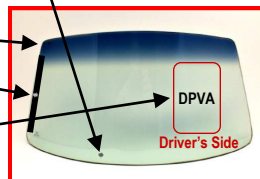
This inter-layering provides three beneficial properties for windshields: first, it functions to distribute impact forces across a greater area of the glass panes, thus increasing the impact resistance of the glass; secondly, it functions to bind the resulting shards if the glass is broken; third, the viscoelastic interlayer undergoes plastic deformation during impact and under static loads after impact, absorbing energy and reducing penetration by the impacting object as well as reducing the energy of the impact that is transmitted to impacting object, e.g. a passenger in a car crash. Thus, the benefits of laminated glass include safety and security. **Note!** Side windows/backglass are Tempered Glass and 'chips' **cannot** be repaired - they will shatter!

Because the windshield is one of the most important safety features of a vehicle, it is very important that anyone attempting a repair be knowledgeable about the *American National Standards of Windshield Repair* and adhere to those standards. It protects the consumer and helps the technician to avoid liability issues from non-compliant repairs and potential litigation. Read the Standard INCLUDING the Annex's at this link: <http://www.rolags.com/pdf/ANSI+NWRA+ROLAGS+001-2014.pdf>

Drilling...

A common practice when repairing small, tight star breaks with 1 or more legs is to drill the pit with a carbide bur and 'pop a bull's eye', using a probe and striking it. This opens up the break to allow the resin to flow and fill the damage. The Standard referred to above states in section 7, Repair Limitations: "Do not repair if there is Damage on the inside lite (layer) of laminated glass." therefore it is critically important **not** to allow the drill bur to penetrate the PVB layer. Only drill 1/3 of the way through the top layer of glass. (See our training video on how to perform this technique). NOTE: Never, drill a bull's eye break due to the fact that the nature of the break design does not lend itself to any gain in improving the delivery of the resin, since the crack is radiated - if you drill it, you are simply drilling into glass (see drawing).

Note that *most of the stress in a windshield is in the outer 3 inches of the glass perimeter*. **Use caution** when repairing damage in this area as it is more likely to 'run' or spread. Inform you customer so that they have the option to agree to the risk of attempting a repair. It is not recommended to repair damage that is located in the shaded area or the black band around the perimeter of the glass because you are 'working in the dark' and cannot see the repair process...poor results may occur. Concerning the Driver's Primary Viewing Area, replacement of the windshield is recommended if: Diameter of damage is larger than one inch (25 mm); The finished pit will be greater than 3/16 inch (5 mm); The repair will be within 4 inches (100 mm) of another repair. (See section 5.4 and 7 of the American National Standards of Windshield Repair.)



American National Standard



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

ROLAGS™
Repair of Laminated Automotive Glass Standard



ANSI/NWRA/ROLAGS 001-2014

(revision and redesignation of
ANSI/NGA R1.1-2007)

American National Standard—
Repair of
Laminated Automotive Glass Standard
(ROLAGS™)

Secretariat

National Windshield Repair Association

Approved February 11, 2014

American National Standards Institute, Inc.

American National Standard

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Foreword (This foreword is not part of American National Standard ANSI/NWRA/ROLAGS 001-2014.)

The Repair of Laminated Automotive Glass Standard (ROLAGS™) was created by the National Windshield Repair Association working under the auspices of the American National Standards Institute (ANSI). NWRA also serves as secretariat for the standard, which replaces and supersedes ANSI/NGA R1.1-2007, the original standard for laminated glass repair.

ROLAGS™ represents the windshield repair industry's best practices as complied under ANSI guidelines by a balanced committee of windshield repair and replacement practitioners, suppliers and other interested parties.

ROLAGS™ contains an industry consensus of recommended terminology, definitions, process, and procedures. These recommendations reflect the expertise of the NWRA Standards Development Committee members who hold a combined experience of hundreds of years and many thousands of actual windshield repairs.

This standard contains five annexes. Annexes A, C, and D are normative and are considered part of this standard. Annexes B and E are informative and are not considered part of this standard.

Suggestions for improvements of this standard will be welcome. They should be sent to the National Windshield Repair Association, 385 Garrisonville Road, Suite 116, Stafford, VA 22554.

This standard was processed and approved for submittal to ANSI by the Standards Development Committee (SDC) of the National Windshield Repair Association. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this edition of the standard, the SDC had the following members:

- Keith Beveridge, Chair
(Novus Franchising, Inc., Savage, MN)
- Debra Levy, Secretary
(AGRR Magazine, Stafford, VA)
- Penny Chatterton, Chair, Product Performance Subcommittee
(Novus Franchising, Inc., Savage, MN)

<i>Company Represented</i>	<i>Name of Representative</i>
Auto One (Brighton, MI).....	Ron Overbeck
Clearview Windshields (Inwood, IA)	Gerald Zwart
Delta Kits (Eugene, OR)	Korey Gobin
Glass Technology (Durango, CO)	Kerry Wanstrath
Technaglass (Salt Lake City, UT)	Troy Mason
Ultra Bond (Grand Junction, CO)	Richard Campfield

This standard was developed by the NWRA Repair of Laminated Auto Glass Standards Committee.

Introduction

NOTES:

- 1) The conversion "One inch equals 25 mm" is used throughout this standard.
- 2) *Windshield Repair* and *Repair of Laminated Auto Glass* are used interchangeably throughout this standard.

Windshield Repair is a permanent process that can be used to repair a laminated windshield that has been damaged.

There are two basic causes for damaged laminated auto glass.

Impact: This is the most common and occurs when an object strikes the glass;

Stress or Twist: A crack occurs when a windshield is twisted, either by flexing within the vehicle frame or because of improper mounting.

The concept of repairing laminated windshields first appeared in 1968. The subsequent development of chemicals and tools, specifically designed for repair of laminated auto glass, has enabled windshield repair, if performed by a trained professional, to usually achieve the following on a finite area of the exterior surface:

- Improve the optical clarity of the damaged area
- Restore a smooth surface to prevent interference with the wipers
- Stop the damage from spreading by adding strength to the damaged area
- Retain the original bond, if applicable, by eliminating the need to replace the windshield

American National Standard

Repair of Laminated Automotive Glass Standard (ROLAGS™)

1. Scope

The Scope of this standard shall be to define:

- Repairable damages;
- The process of windshield repair;
- The performance criteria for repaired laminated glass.

This standard shall also provide best practices for the training of a repair technician.

2. Purpose

It is the intention of the Repair of Laminated Automotive Glass Standards Committee (ROLAGS™) that this document:

- Be used to consistently evaluate damages on laminated auto glass in order to aid in the decision to repair or replace the glass;
- Assist the public in understanding what is achieved through windshield repair (repair of laminated auto glass);
- Encourage technicians to strive for the highest quality repair;
- Codify the current best practices of laminated auto glass repair.

3. Normative References

See annex A.

4. 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.



Figure 1 – Bullseye

4.2 Chip: Non-technical term, commonly used by the public, for damage on a windshield.

4.3 Combination Break: Damage with multiple characteristics, i.e., star within a bullseye, short or long crack(s) emanating from the damage.



Figure 2 – Combination Break

4.4 Crack: Single line of separation that may emanate from an impact point.

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.

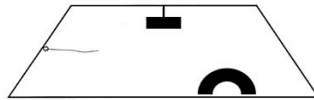


Figure 3 – Edge Crack

4.4.4 Floater Crack: Any crack that does not extend to an edge.

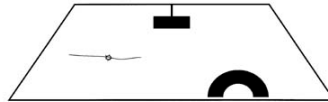


Figure 4 – Floater Crack

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, commonly used by the public, for damage on a windshield.

4.7 Half Moon: Partial bullseye.

4.8 Impact Point: Location on the glass that was struck by an object and results in damage.

4.9 Laminated glass: Two or more layers of glass with a non-glass inner layer(s).

4.10 Legs: Subsurface cracks that emanate from the break.

4.11 Lite: A single layer of glass.

4.12 Pit: Impact point from which a small piece of glass is missing.

4.13 Repair: A process that removes air from the break either by vacuum or displacement and fills the break with resin.

4.14 Star Break: Damage that exhibits a series of legs that emanate from the break.

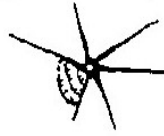


Figure 5 – Star Break

4.15 Stone Break: Non-technical term, commonly used by the public, for damage on a windshield.

4.16 Surface Pit: A nick in the glass associated with normal wear and tear that does not penetrate to the plastic interlayer.

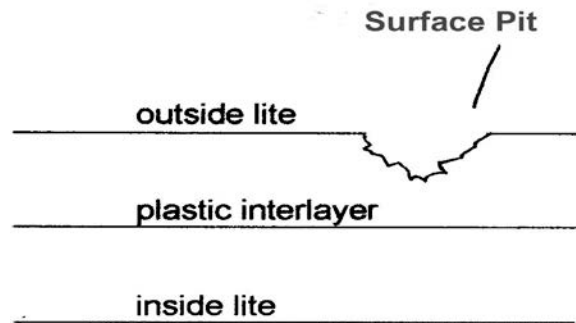


Figure 6 – Surface Pit

4.17 Typical Portrayal of Windshield Damage, Adequate and Inadequate Repairs:
See annex E.

5. Other Related Terminology

5.1 Binocular Vision: Vision in which both eyes are used together. Human vision compensates for an obstruction to the vision of one eye with the unimpeded vision of the other eye. If both eyes are obstructed, no compensation is possible and a blind spot occurs. Thus, two windshield repairs, in the same proximity may cause the aforementioned phenomenon. This restriction is limited to the Driver's Primary Viewing Area.

5.2 Cosmetic Blemish: A remnant of damage that is still visible after the repair is completed.

5.3 Distributor: Any firm that purchases, for resale, complete repair kits or parts of kits from manufacturers.

5.4 Driver's Primary Viewing Area (DPVA): An area on the exterior of the windshield:

- 12 inches wide (300 mm wide);
- Centered on the driver's position;
- Extending from the top to the bottom of the wiper sweep.

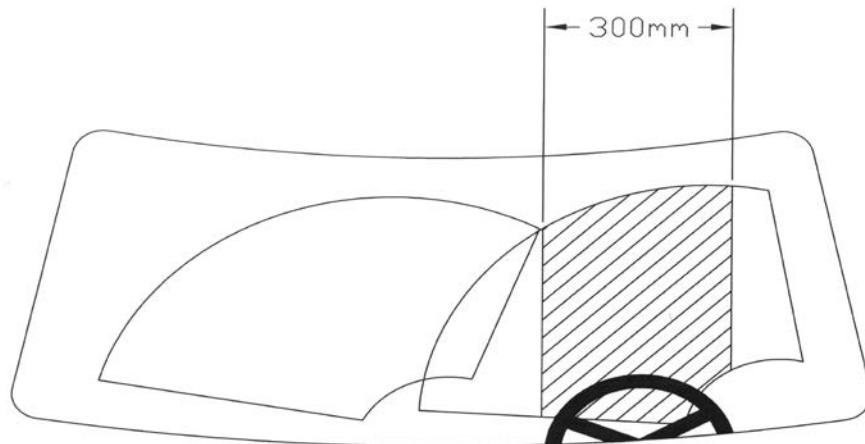


Figure 7 – Driver's Primary Viewing Area (DPVA)

- 5.5 Manufacturer:** Any firm that produces equipment, resins, or other materials used in the repair of laminated auto glass.
- 5.6 Plastic Interlayer:** Layer of plastic that bonds two pieces of glass that may also be referred to as the laminate or PVB (polyvinyl butyral).
- 5.7 Refraction:** The bending of light rays while passing from one medium to another.
- 5.8 Resin:** An organic material that approximates the refractive index of the laminated glass and, when cured, will seal the break or crack.
- 5.9 Wiper Sweep:** An area on the windshield cleaned by a motorized arm with a flexible blade attached.
- 5.10 Value-Added Features:** Items added to the windshield, by the manufacturer, such as certain coatings, rain sensors, heads-up displays (HUD), Night Vision, Global Positioning Systems (GPS) antennas, etc.

6. Damage Types and Repairable Dimensions

- 6.1 Bullseye:** With a diameter no larger than one inch (25 mm).
- 6.2 Combination Break:** Diameter of body (excluding legs) not to exceed 2 inches (50 mm).
- 6.3 Crack:** No longer than 14 inches (350 mm).
- 6.4 Half Moon (Partial Bullseye):** With a diameter no larger than one inch (25 mm).
- 6.5 Star Break:** Diameter of the break not to exceed 3 inches (75 mm).
- 6.6 Surface Pit:** Damage with a diameter of not less than 1/8 inch (3 mm).

7. 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:

- Damage that penetrates both the inside and outside layer of a laminated glass;
- Damage with three or more long cracks emanating from a single impact point;
- Damage on the inside lite (layer) of laminated glass;
- Damage contaminated with visible impurities that cannot be removed through cleaning;
- Damage or discoloration to the plastic interlayer;
- Damage in an area of the windshield where value-added features may be negatively affected by the damage and/or the repair process;
 - Repair technicians should consult and follow any vehicle manufacturer's recommendations before performing a repair on any value-added feature (see 5.10);
- Damage with a pit size greater than 3/8 inch (9 mm);
- Edge crack(s) that intersect more than one edge;
- Stress cracks;
- In the Driver's Primary Viewing Area (DPVA) if:
 - Diameter of damage is larger than one inch (25 mm);
 - The finished pit will be greater than 3/16 inch (5 mm);
 - The repair will be within 4 inches (100 mm) of another repair (see 5.1);
- If, in the technician's judgment, the repair will affect the proper operation of the vehicle.

8. Process to be Followed by the Repair Technician

NOTE: All steps given in this clause are to be carried out in accordance with the manufacturer's suggested instructions unless the instructions are in conflict with this standard.

- 8.1** In order to ensure the best possible repair, the technician shall do the following:
- (1) Inspect the damage from both inside and outside the glass to determine if the damage is repairable (see clauses 6 and 7);
 - (2) Remove moisture, dirt, foreign matter, loose glass, and contamination from the damaged area;
 - (3) If the temperature of the glass is outside the recommended range, cool or warm the glass accordingly;
 - (4) Access the damage through probing or drilling;
 - (5) Protect the resin from premature curing;
 - (6) Remove the air from the break, either by vacuum or displacement, and fill the void with resin;
 - (7) Properly perform pit filling and resin curing;
 - (8) Finish the repair to be flush with the glass;
 - (9) Inspect the finished repair (see clause 9).

8.2 Crack Repair

- (1) Completely fill the crack with the appropriate resin(s);
- (2) Place a bead of resin on top the crack;
- (3) Properly cure the resin;
- (4) Finish the crack repair to be flush with the glass;
- (5) Inspect the finished crack repair.

9. Inspection of the Repair Quality by the Technician

- The repair shall be inspected visually from the driver's position within the vehicle.
- The repair should be free of significant light scatter, dirt, road contaminants, air pockets, and other optical defects that may affect the proper operation of the vehicle.
- 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) (see 5.4).
- The repair should not interfere with the normal operation of the windshield wipers.

10. Training of a Repair Technician

The technician shall be trained in accordance with this standard, with such training to include:

- Both active (hands-on) and passive coursework;
- Passage of both a written and practical exam;
- Adequate maintenance of records on all participants and their final exam scores.

11. Performance Requirements for Repair of Laminated Auto Glass

Repair of laminated auto glass is a permanent process that removes air from the break either by vacuum or displacement and results in the break being filled with a curable resin that approximates the refractive index, color and clarity of the laminated glass. To accomplish this, it is recommended that a windshield repair system include the following:

- A process to:
 - Inspect the damage and apply repair criteria;
 - Check for moisture and other visible contamination;
 - Ensure that the break is filled.
- Equipment to:
 - Remove moisture and other visible contamination;
 - Access the damage.
 - Remove or displace air and inject the repair resin.
 - Properly perform pit filling and resin curing processes.

- Resin that will:
 - Meet the manufacturer's requirements that are specific to the repair system's equipment such as viscosity, cure rate and ability to be polished;
 - In its cured state, approximate the refractive index, color and clarity of the laminated glass that is being repaired;
 - Minimize light refraction and seal the laminate in a crack;
 - Be recognized as conforming to this standard.

- To be recognized as conforming to this standard, the resin manufacturer shall be able to submit test results from an independent laboratory showing that resins meet the success criteria of the testing protocol as outlined in annex C, Test Protocol for Repair Systems.

Annex A
(normative)

Normative Bibliography

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ASTM D1544-04, *Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)*

ASTM D1003-07e1, *Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics*

AS/NZS 2366.2: 1999, *Windscreen repairs, repair systems* (Australian/New Zealand Standard)

SAE Z26.1-1996, *Safety Glazing Materials for Glazing Motor Vehicles and Motor Vehicle Equipment Operating on Land Highways – Safety Standard*

NOTE: A normative annex is an integral part of a standard.

Annex B
(informative)

Informative Bibliography

ANSI/AGRSS 002, *Automotive glass replacement safety standard*

NOTE: Use only the most current edition of ANSI/AGRSS 002.

AS/NZS 2366.1:1999, *Windscreen repairs, Part 1: Repair procedures*, Standards Australia/Standards New Zealand

BS AU 242:1998, *Automotive windscreen repair – Code of practice*, British Standards Institution (BSI)

BS AU 251:1994, *Specification for performance of automotive laminated windscreen repair systems*, British Standards Institution (BSI)

Recommended Practice for the Repair of Windshields, National Windshield Repair Association, Sept. 2002

Letter from Jacqueline Glassman, Chief Counsel for National Highway Traffic Safety Administration, dated July 7, 2004, to Leo Cyr. (Can be found at <http://isearch.nhtsa.gov/files/Cyr.1.html>.)

Annex C
(normative)

Test Protocol for Repair Systems

C.1 Purpose

The purpose of this test protocol is to evaluate, in various ways, repaired pieces of laminated glass with damage as described in clause C.3, Test Samples, in order to make a determination of the suitability for windshield repair, of the resins used to perform those repairs.

C.2 Normative References

See annex A.

C.3 Test Samples

C.3.1 Glass

Laminated AS-1 type, 0.03 in (0.76 mm) interlayer thickness and 0.2 in (5 mm) total thickness, 12 in (305 mm) square, unless otherwise specified

C.3.2 Resin

Only one repair resin may be submitted per test protocol. The pit resin used is considered to be part of this unique repair system, but the same pit resin may be used to certify multiple repair resins.

C.3.3 Repairs

C.3.3.1 Bullseye, star or combination break

- minimum diameter of 0.6 in (15 mm)
- maximum diameter as allowed in clause 6 of this standard
- repaired according to directions of that resin's seller
- located in geometric center of test glass, unless otherwise permitted or directed

C.3.3.2 Crack

C.3.3.2.1 For Repair Resins

At least a 4 inches x 12 inches (102 mm x 305 mm) test glass otherwise meeting the criteria of C.3.1, with a repaired crack running across the width and centered on the length.

C.3.3.2.2 For Crack Resins

A 12-inch (305-mm)-long test glass of width up to 6 inches (150 mm), and otherwise meeting the criteria of C.3.1. The repair shall be performed across that width and centered on the length.

C.4 Tests

C.4.1 Visual Appearance

C.4.1.1 Samples

Pull one sample of each type of repair at random from all samples that will undergo Accelerated Weathering, as described in annex D.

C.4.1.2 Method

C.4.1.2.1 Evaluate appearance in accordance with the criteria in clause 9 of this standard. However, repairs are to be inspected at a 45° angle. Also, examine the pit area (if applicable to that repair) and the rest of the repaired damage for the success criteria in C.4.1.3 below.

C.4.1.2.2 Perform Accelerated Weathering, as described in annex D, and then evaluate appearance again as in C.4.1.2.1.

C.4.1.2.3 These weathered samples may then be used for their specified purpose.

C.4.1.3 Expected Results

In addition to meeting the criteria of clause 9 of this standard, the pit resin (if applicable to that repair) shall not be delaminated or crazed. Yellowing of the pit resin beyond a Gardner Index of 5, as evaluated via ASTM D1544-04, *Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)*, is not permitted. These pit evaluation criteria apply both before and after the samples have undergone Accelerated Weathering, as described in annex D. Also, no re-opening of the damage due to the exposure of Accelerated Weathering (annex D) is permitted.

C.4.1.4 Retesting

C.4.1.4.1 Unexposed Samples

If one test piece fails to conform to the criteria in C.4.1.3, pull another test piece of the same type and examine it to see if it meets the criteria of C.4.1.3. Repeat up to two more times, if necessary.

C.4.1.4.2 Exposed Samples

If one test piece fails to conform to C.4.1.3, resubmit up to three additional samples for retesting.

C.4.2 Impact Resistance by Ball-Drop

C.4.2.1 Samples

C.4.2.1.1 Use six samples of combination break repairs, as specified in C.3.3.1, to evaluate repair resins.

C.4.2.1.2 Use six samples of crack repairs, as specified in C.3.3.2, to evaluate crack resins.

C.4.2.2 Method

C.4.2.2.1 Subject three samples of each type to Accelerated Weathering (annex D).

C.4.2.2.2 Perform *Penetration Resistance, Test 26* from SAE Z26.1-1996, on all samples. Place the repaired side down (opposite the impacted side).

C.4.2.3 Expected Results

Success as specified in Test 26 of SAE Z26.1-1996, both before and after Accelerated Weathering (annex D).

C.4.2.4 Retesting

C.4.2.4.1 Unexposed Samples

If one test piece fails to conform to C.4.2.3, another set of three like samples shall be tested. This may be repeated for a maximum of three test rounds. If, in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of this test.

C.4.2.4.2 Exposed Samples

If one test piece fails to conform to C.4.2.3, another set of three like samples shall be subjected to Accelerated Weathering (annex D) and then tested. This may be repeated for a maximum of three test rounds. If, in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of the Impact Resistance by Ball-Drop Test (C.4.2).

C.4.3 Mechanical Strength by Three-Point Bend

C.4.3.1 Samples

C.4.3.1.1 Repair Resins

Use six samples of crack repairs, as specified in C.3.3.2.1, to evaluate repair resins.

C.4.3.1.2 Crack Resins

Use six samples of crack repairs, as specified in C.3.3.2.2, to evaluate crack resins.

C.4.3.2 Method

C.4.3.2.1 Subject three samples to Accelerated Weathering (annex D).

C.4.3.2.2 Perform Test A5.8, *Testing for the mechanical strength of a repaired crack*, from AS/NZS 2366.2:1999, on all samples.

C.4.3.3 Expected Results

These results apply to samples tested without or with Accelerated Weathering (annex D).

C.4.3.3.1 Repair Resins

Greater than 50% of the mean force required to produce cracks in undamaged test pieces;

C.4.3.3.2 Crack Resins

Greater than 70% of the mean force required to produce cracks in undamaged test pieces.

C.4.3.4 Retesting**C.4.3.4.1 Unexposed Samples**

If one test piece fails to conform to C.4.3.3, another set of three like samples shall be tested. This may be repeated for a maximum of three test rounds. If, in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of the Mechanical Strength by Three-Point Bend Test (C.4.3).

C.4.3.4.2 Exposed Samples

If one test piece fails to conform to C.4.3.3, another set of three like samples shall be subjected to Accelerated Weathering (annex D) and then tested. This may be repeated for a maximum of three test rounds. If in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of the Mechanical Strength by Three-Point Bend Test (C.4.3).

C.4.4 Optical Properties Testing**C.4.4.1 Luminous Transmittance/Haze**

Determines levels of loss of transparency due to repair's presence

C.4.4.1.1 Samples

Samples may have more than one repair on the glass and more than one repair type on the glass. At least two repairs of each type shall be evaluated. Repairs shall otherwise meet the criteria of C.3.3.1.

C.4.4.1.2 Method

Perform this test in accordance with ASTM D1003, *Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics*. Perform the test before and after Accelerated Weathering (annex D).

C.4.4.1.3 Expected Results

All unexposed repairs shall retain 95% of the transmittance of undamaged glass. These same repairs shall not have haze more than 4 percentage units above that of the undamaged glass (e.g., if the undamaged glass has 0.5% haze, the repaired areas may not exceed 4.5% haze).

All exposed repairs shall have luminous transmittance of at least 75%.

C.4.4.1.4 Retesting

C.4.4.1.4.1 Unexposed Samples

If one test piece fails to conform to C.4.4.1.3, another set or test piece of like samples shall be tested. This may be repeated for a maximum of three test rounds. If, in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of the Luminous Transmittance/Haze Test (C.4.4.1).

C.4.4.1.4.2 Exposed Samples

If one test piece fails to conform to C.4.4.1.3, another set or test piece of like samples shall be subjected to Accelerated Weathering (annex D) and then tested. This may be repeated for a maximum of three test rounds. If, in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of the Luminous Transmittance/Haze Test (C.4.4.1).

C.4.4.2 Distortion/Deviation

Determines levels of light refraction or image distortion due to repair's presence

C.4.4.2.1 Samples

- a) Repair Resins – Use two samples each of:
 - o Bullseye repairs as specified in C.3.3.1
 - o Star repairs as specified in C.3.3.1
 - o Crack repairs as specified in C.3.3.2.1
- b) Crack Resins – Use two samples of crack repairs as specified in C.3.3.2.2.

C.4.4.2.2 Method

SAE Z26.1-1996, *Optical Deviation and Visibility Distortion, Test 15*

C.4.4.2.3 Expected Results

Less than 2 minutes of arc shift in secondary image

C.4.4.2.4 Retesting

If one test piece fails to conform to C.4.4.2.3, another set of two like samples shall be tested. This may be repeated for a maximum of three test rounds. If, in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of the Distortion/Deviation Test (C.4.4.2) as regards that type of repair.

C.4.5 Resistance to Thermal Cycling

C.4.5.1 Samples

C.4.5.1.1 Repair Resins

Use three samples of combination break repairs, as specified in C.3.3.1, to evaluate repair resins. The legs of the combination breaks shall extend past the bullseye portion of the break.

C.4.5.1.2 Crack Resins

Use three samples of crack repairs, as specified in C.3.3.2.2, to evaluate crack resins, except that the crack length is only to extend about halfway across the sample glass, or about 6 inches (150 mm).

C.4.5.2 Method

C.4.5.2.1 Apparatus

- a) Fixture for holding repaired samples over heat gun;
- b) Heat gun capable of continuous temperature adjustment (such as Makita Model HG1100, or equivalent);
- c) Freezer;
- d) Probe- or thermocouple-type thermometer capable of reading at least 0°F (-18°C) to 300°F (150°C).

C.4.5.2.2 Procedure

- a) Before starting the test, position the heat gun within the fixture so that the outlet is 2 inches (50 mm) directly below where the repair will be. Turn on the heat gun and adjust the thermostat until the exiting air temperature is a constant 225°F (107°C) at the spot where the air will impinge the bottom surface of the glass. If the heat-up time is more than 30 seconds, have the heat gun already running and equilibrated before the sample is placed over it.
- b) Place the first repaired sample in freezer set to 0°F (-18°C) and allow to equilibrate for one hour.
- c) Remove the sample from the freezer and make a quick check of its repair condition. If this is acceptable, place the sample on the fixture, repair side up.

- Affix the temperature probe or thermocouple wire to the top of the sample over the center of the repair.
- d) Allow the heat gun to heat the underside of the glass directly under the repair until the repair side reaches 150°F (66°C). Remove the sample and allow it to cool to 100°F (38°C). As it is cooling, examine it for any of the failure criteria described in C.4.5.3, Expected Results.
 - e) If the sample has not failed, repeat the freezer/heat gun cycling up to two more times
 - f) Repeat steps (a) – (e) on the other two repaired samples.

C.4.5.3 Expected Results

In addition to meeting the criteria of clause 9 of this standard, the repair should remain unchanged. The star portion shall not separate from the glass or the PVB. No voids shall appear in the bullseye.

C.4.5.4 Retesting

If one test piece fails to conform to C.4.5.3, another set of three like samples shall be tested. This may be repeated for a maximum of three test rounds. If in each round of tests, a sample fails to meet the success criteria, then the resin used is considered not to conform to the requirements of Resistance to Thermal Cycling Test (C.4.5) as regards that type of repair.

Annex D
(normative)

Accelerated Weathering

D.1 Samples

Perform on all samples for which pre-test accelerated weathering is prescribed. At least two samples of each type shall ultimately be tested.

D.2 Method

D.2.1 Irradiance

UVA 340 bulb, or equivalent

D.2.2 Cycle

8 hours UV plus condensation at 140°F (60°C)
4 hours condensation at 122°F (50°C)

D.2.3 Total Cycle Time

500 hours

D.3. Expected Results

See the various “Expected Results” clauses in this standard.

Annex E
(informative)

Typical Portrayal of Windshield Damage

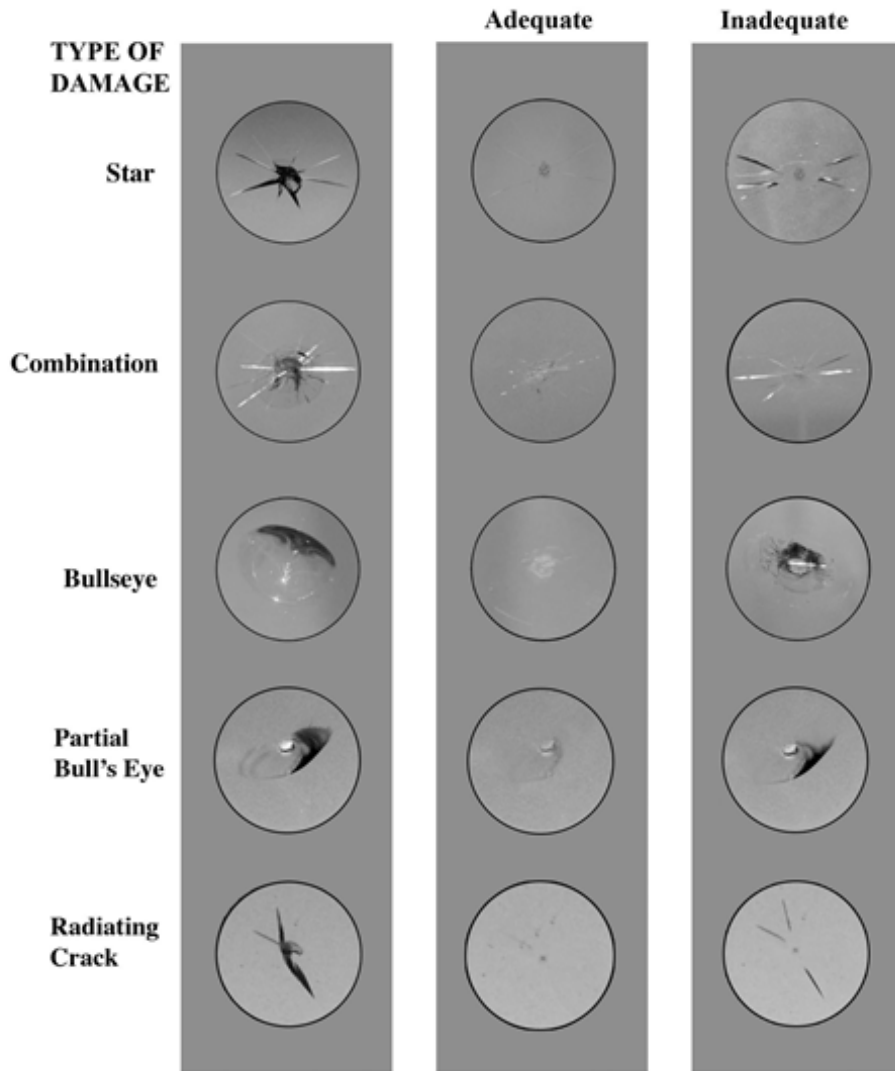


Figure E.1 – Quick Reference of Typical Repairs

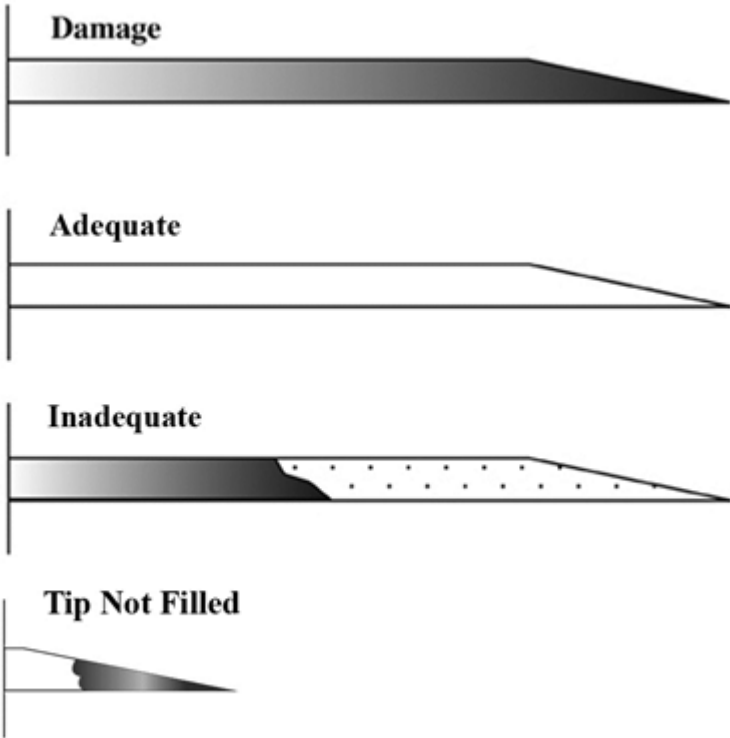
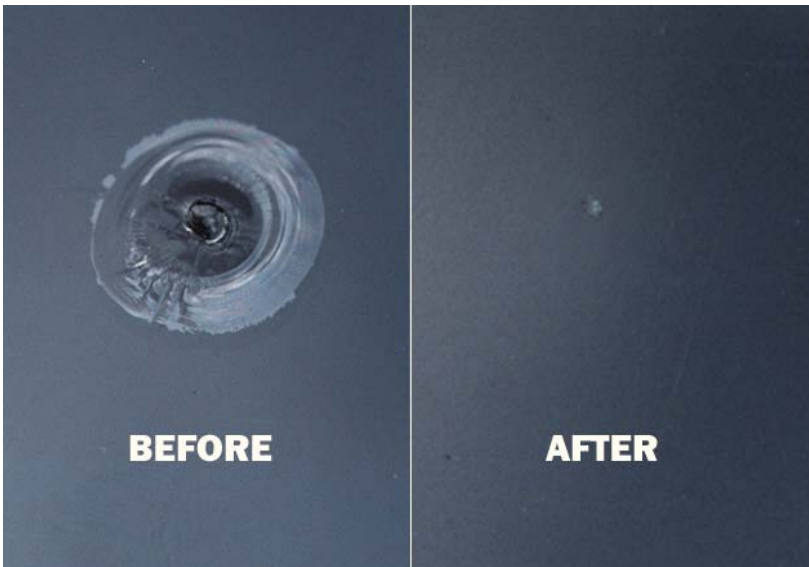
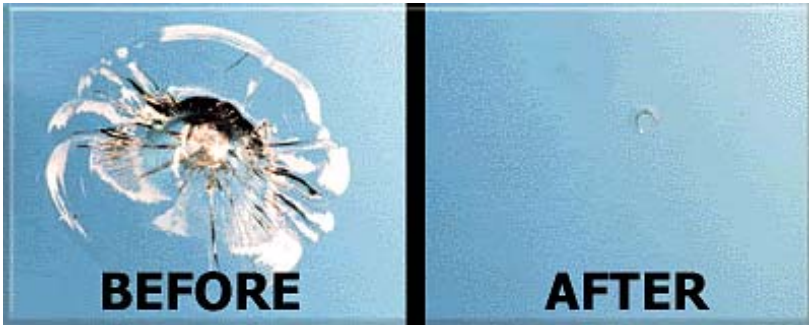
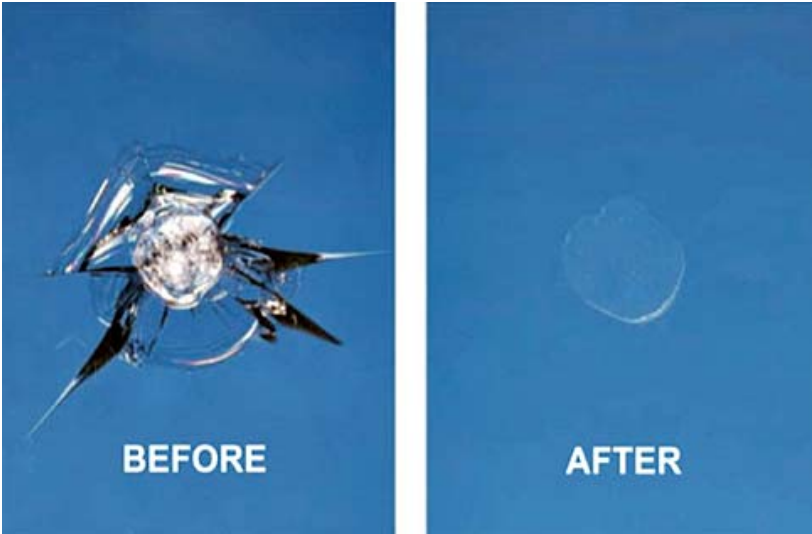


Figure E.2 – Adequate and Inadequate Crack Repair

Before and After Pictures

Use these for flyers and documents



How to Start Up a Windshield Repair Business

The Opportunity of Windshield Repair

It is estimated that 7 out of 10 vehicles on the road today receive some type of windshield damage, usually from a small stone hitting the windshield while driving. With the average cost of a repair being between \$45.00 to \$65.00 for the first repair and as much as \$10.00 to \$25.00 for each additional repair, that could turn into a sale of \$115 in less than 45 minutes! With cost of goods of less than \$1.00 at an average sale price of \$55.00 per repair, that equates to a great return on investment!



The windshield repair industry is quickly becoming the one of the largest growing automotive service markets in the United States. WindShield Repair is, indeed, a lucrative industry!

WSR has virtually no barriers to entry - no education or licensing. Considering the low investment cost, it's one of the best investments you can make whether you are planning on supplementing your current income or striking out on your own and creating a new business venture. Here's some observations and benefits of a WSR Business:

- **Low initial investment** and minimal monthly business operating overhead
- **Home-based business** opportunity, flexible business hours, virtually no inventory
- **High consumer demand** - everyone owns a vehicle
- Can be a part time or full time venture - Holidays off, **flexible schedule**
- **No regulations or licensing requirements** and a **very short learning curve**
- It is a low cost, high visibility automotive repair that is **easy to sell**
- Inexpensive and **readily available business equipment** that requires practically no maintenance.
- **Potential to grow your business** by hiring employees or independent contractors
- **A high percent of cash sales**
- **Simple business model that you can easily expand** into additional related services such as headlight repair, detailing or accessories

Is it Right for You?

Whether you are looking to quit a dead end job, tired of working for 'the Man', frustrated finding a decent job, or just want to reach your full potential without any barriers, WSR could be a good fit for you. However, like any employment opportunity, you need to make sure you are suited for the job...



- You must be a **self-starter and confident** that *you* can make it happen - not afraid to take risks
- **Able to work alone**, without support - posses a **strong work ethic**
- **Willing to learn new things** and commit to a course of action - able to 'think outside the box'
- Have blocks of **time that you can devote to your venture**
- **Ability to prioritize**, be **flexible** and the ability to **make quick decisions**
- **Physically and mentally healthy** - able to keep focused when you are not feeling the best
- An **honest, sincere desire to help others** and love working with people
- **Possess mechanical ability**, a strong **attention to detail** and good **organizing skills**
- **Suited well to working outside** in any weather condition
- **A competitive spirit, goal driven** and have the ability to shake off emotions
- **Good at managing and budgeting money**, strong **communication skills** and a **neat appearance**
- **Investment money for tools/supplies**, marketing, business expenses and short term income. [starting your business part time, can provide money from sales which can be invested back into your business]

There is no doubt that if you possess the attributes mentioned above, you can start and grow a successful WSR business!

The Competition - Pricing and Challenges

The first thing you will want to accomplish is **a full inventory of WSR service providers in your area**. Check online and see who is listed. Note - many larger glass shops will show a presence in markets that they actually do not service, so don't assume that they are a competitor without follow up investigating. Look for advertising flyers, ask automotive parts and repair shops, insurance offices, rental car agencies, trucking companies, fleet owners and dealerships - new and used. Get the company names and phone numbers and then call these WSR shops to get their prices - cash and insurance price and find out if they are local, out-of-town, mobile or a shop based business.



Don't become disillusioned. If you have, what appears to be, stiff competitors in your area...it just means that you will need to **differentiate yourself** from them in a way that will win clients. Your charm, sincerity, work ethic, promptness, appearance, pricing, quality and a sincere desire to serve others can make you stand head and shoulders above even well entrenched competitors!

Once you have evaluated your competition and have an idea of what you can charge in your market, you will be well on your way to take the plunge. You will be armed with the facts of what you are up against. Remember, knowledge is power! **BE the competition others will tremble at when they see you doing a repair**....not because you are a price-gouging low quality technician/owner, but because you present yourself and your company well... you are a confident, but appreciative, business person.

Conceiving and Organizing Your Business

Based on the information in the two sections above, **picture in your mind what kind of business model you see**. Do you have a building, shop or garage to work out of or do you have a small, fuel efficient car that would be perfect for doing on-site repairs? Do you see plans of growing your business or someday selling a successful on-going business? Do you just want a part time business to supplement your income? Do you envision a Sole Proprietor or an LLC (Limited Liability Corporation)?



Are you able to manage your books or do you feel more comfortable having a bookkeeper or accountant handling some of **accounting functions**?

Do you want to create an **office space** in your home or would you rather work from a library, or coffee shop so that you can be free from family distractions when you need to do administrative work?

Find a person who is capable and willing to **mentor** you in this process. Preferably a business person... someone you trust and respect.

What will be the **name of your business**? A recommendations; avoid using your name - it's usually not perceived as professional and if you ever want to sell you business...you'll regret it. Be careful if you include the name of your town or city - unless it is large and you do not envision growing into other markets. Be creative and choose a name that will lend itself to a simple logo.

Logos are a great way to say a lot in a split second. If you are not a graphic artist, find someone who is - *the image that represents your business is one of the most important marketing choices you will make*. Keep it simple, and makes sure it will work visually, as a black and white image and as a color image. Also, choose a logo that will lend itself to a dark or light background.



What You Will Need

- **Windshield repair kit** - professional quality
- **A clean, reliable vehicle - magnetic signage**
- **Cell phone / Computer**
- **\$5000,000 in business liability insurance** - See your insurance agent or shop online
- **State sales tax permit** - available online - You will need to collect and pay sales tax
- **EIN** - Employer Identification Number available online
- **Uniform shirt** with your company name/logo on it
- **Business Documents** such as a Damage Waiver and Warranty
- **Business Cards** (search Google images for ideas), notepads or pens with your phone number
- **Website** - www.wix.com is low cost and easy to learn - **Website address**
- **Pop up tent with banner** signage - see our banner at www.autoglassolutions.com or check eBay
- **Accounting Software** such as QuickBooks and, if you want to bill insurance companies, a partnership with a Third Party Administrator (TPA) - we recommend **eDirectGlass** - see in 'Billing', below

Choosing a Kit

There are plenty of WSR kits and resins to choose from. Sorting out the best values can be tricky. Here are some things to look for:

- **Affordability**
- **Attachment device style**
- **User-friendliness** - Efficiency of switching between vacuum and pressure
- **Durability**
- **Gauge** that shows amount of vacuum and pressure being applied - indicates leaks in the set up
- **Aesthetic appeal** - does your equipment look professional to your clients
- **Quality of components - warranty**
- **Training options:** Video, phone email and text support, on-site training
- **Remote units** - with a hose between the pump and injector - allows greater observation and control, great in cold climates.
- **Self-contained units** - compact and can be more affordable
- **Three important results:** The repair system, which includes the resin, must achieve:
 - A **strong, long lasting, non yellowing repair**
 - The repair must be **clear and completely filled with resin**
 - You should be able to quickly achieve **high quality results**

Note - See our full line up of WSR Kits at www.autoglassolutions.com

Training

The key to learning WSR is to have **a kit that is easy to learn and a resin that easily wicks** (flows) into the break. Beyond that, your training can take on a few basic forms:

Training Videos can be a great way to learn the basics of WSR. Our training videos cover all the basics and even some more complex solutions. It is a good idea to watch them again and again...as you progress, you will see things that you missed on previous viewings. Study the written operating instructions....more than once.

Phone, text and email support from your kit's manufacturer can be a great way to learn how to use your specific tool and equipment. **AutoglasSolutions** provides you with a knowledgeable staff who can help walk you through tough repairs.

Practice - Consider purchasing our **RepairDemo™** - an 8 ½ x 11 sheet of laminated safety glass with 15 easy chips for you to repair. You will learn how to set up your equipment and



gain confidence, setting you up for a successful career! -See at: www.autoglassolutions.com Then, once you have the basics down, practice on your own vehicles, even friends, relatives - anywhere you can find broken windshields.

On-Site Training may be what you are looking for if you want to fast track your learning curve and have the money to invest. **AutoglasSolutions** provides an excellent on-site training program conducted by Master Technician, Dan Polzin. **Call (515) 229-0070 for more information.**

Marketing

- **Choose a domain name and build a web site** - Here are some good sources: www.wix.com www.sitebuilder.com www.godaddy.com www.squarespace.com Make sure you choose a domain name that is easy to type and reflects your business' name
- **Social Media** - FaceBook, Twitter, Instagram, etc...
- **Business cards and Flyers** - drop them off anywhere people are....beauty shops, offices, businesses of all kinds even parking lots - place on wiper. Post them on bulletin boards
- **Signage** - magnetic sign for your vehicle, banners for remote repairing at convenience stores and other businesses - offer to clean the glass on the car and look for chips on the windshield
- **Uniform** - Imprint your name and logo - pull over 'golf shirts' are more professional than t-shirts - coordinate color with your logo.
- **Local Groups** - Become a member of local social clubs such as the Chamber of Commerce, church, Kiwanis, etc....the more connections you make with people, the better
- **TPA's** - By connecting up with a Third Party Administer such as **eDirectGlass**, you will become connected to networks that may direct business your way
- **Newspaper** - don't over look this seemingly 'dated' choice. Small, free local papers or your city/county paper usually have business classified sections...have them put an image of your business card as the ad (make sure it has your name, logo, website, email address and phone number on it)
- **Car dealers, fleet owners/businesses, car rental agencies, trucking companies, insurance agencies, municipalities, law enforcement, utility companies.** Get your name out there and look professional. Develop a convincing sales pitch...keep it simple, short and honest. Be a nice person...someone people can relate to and would like to send business to. **Word of Mouth** is still the best marketing



Billing Options

- You must **handle the billing question up front** with your customer and be prepared to handle it in a manner that suits you and your customer.
- **Sell directly to your customer** and get paid in cash, check or credit card. If they want to turn in the claim, they can present your paid invoice.
- Many customers will **want you to bill the insurance company directly** because most insurance companies will waive the deductible amount on the claim - meaning that the customer will not have to pay any out of pocket expense. This is best achieved by:
- **Bill insurance companies through a TPA** (Third Party Provider). We recommend **eDirectGlass**. They are a great match for start up and small WSR business. See the Silver Package - bottom of the page at this link: <http://www.edirectglass.com/overview.html> Their system interfaces seamlessly with QuickBooks, so no re-entering details and documents! Call (480) 993-0915 ext 201 to speak to sales. You can even get a 30 day free trial at the link above.



When doing work **for local businesses, they may ask to pay you on a monthly basis** so that they can write just one check at the end of the month. Included in this list is body shops, car dealers, fleet accounts, car rental accounts, trucking companies, municipalities and any company that has multiple vehicles.

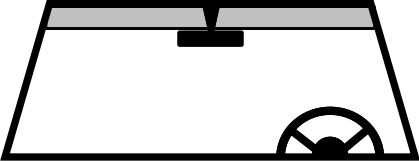
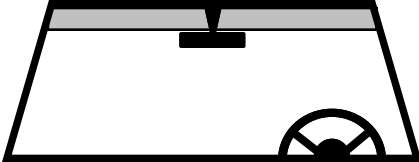
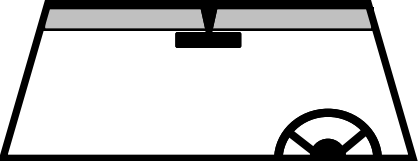
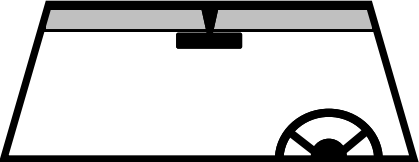
WORK ORDER - INVOICE

**Your
Logo
Here**

Your company Name
Address
City
State Zip Code
Phone Number
Email address
Website

Invoice #
Date
Account No.
Invoice #
SS #
VIN #

Customer Name	Bill To
---------------	---------

	# Repairs	Amount
Year _____ Make _____ Model _____  Plate # _____ Unit # _____ <i>Indicate Damage</i>		
Year _____ Make _____ Model _____  Plate # _____ Unit # _____ <i>Indicate Damage</i>		
Year _____ Make _____ Model _____  Plate # _____ Unit # _____ <i>Indicate Damage</i>		
Year _____ Make _____ Model _____  Plate # _____ Unit # _____ <i>Indicate Damage</i>		
	Sub Total	
	Tax	
	Total	

Signature _____ Date _____

Long Crack Repair Procedures

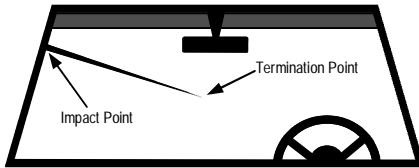


Figure 1

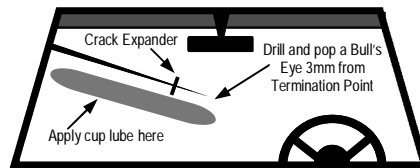


Figure 2

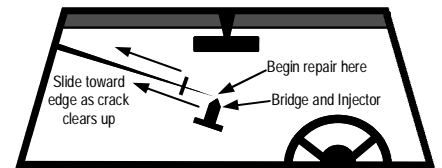


Figure 3

Qualifying The Client

Tell your client that most repairs take between 30 and 40 minutes. Make sure that they have the time to allow you to successfully finish the repair.

Explain that the repair will NOT disappear, but that it will be 'structurally sound and cosmetically improved'. Explain that you are using the best repair system and resins available. This sets the client's expectations at a reasonable level so that they will be satisfied with the repair. Be confident, but honest about the results they can expect.

Inspection and Assessment

Examine damaged area from the inside and outside of the vehicle. Look for 'hidden' cracks, moisture, contamination or previous repair attempt. Most Cracks begin from damage near the edge of the windshield. The crack is wider and more 'open' near this edge, and then narrower and tighter as it travels out to the termination point.

Assess to make sure temperature of the windshield is warm - if not, warm the windshield by running the car's defrosters or other heat sources such as a torch or heat gun.

Safety First be sure to wear safety glasses and nitrile gloves.

Preparation

Clean the windshield using a small amount of glass cleaner - spray on a towel and wipe the windshield clean.

Locate the **Termination Point** of the crack (Figure 1) and drill a hole about **1/8 inch or 3mm** past the termination point. Use low speed and do not drill into the PVB. Then 'pop' a 'bull's-eye' by placing the probe on the impact point and gently tapping. This will stop the crack from spreading beyond the termination point (Figure 2).

Next, using a liberal amount of **Cup Lube** or lotion (thin hand of body lotion will work) to the suction cup on the bridge and also spread it on the area of the windshield where the bridge will travel (Figure 2).

Repair Process (see Basic Operating Procedures on how to use your particular kit)

Attach the **Bridge and Injector** to the windshield over the bull's eye - screw the injector down over the bull's eye so that the O-ring just makes a good seal (do not allow the injector to apply too much downward pressure on the windshield surface). Next deposit 10+ drops of **Tinted Crack Repair Resin** into the filling port and replace the cap. Use vacuum.....then light pressure to 'repair' the bull's eye (do not remove the injector at this point) (Figure 3).

Now, apply lube to the suction cups on the **Windshield Crack Expander** and attach it to the **INSIDE** of the windshield, about 3 inches in from the termination point - screw down the center nylon bolt onto the crack, applying slight outward pressure to open up the crack so that it more easily accepts the resin (Figure 2).

Next, with the pressure in the injector, slowly move the **Bridge and Injector Assembly** along the break...slowly, waiting for the resin to fill the crack ahead of the injector. As you get close to the **Crack Expander**, pull it along the crack at the same rate as you pull the **Bridge and Injector**. Apply more pressure in the injector as you work toward the edge of the windshield. Work slowly (Figure 3).

As you move along the crack, apply resin on the outside of the filled crack and lay down strips of the **Mylar Crack Curing Sheet** (cut into strips if desired).

Once the crack is filled, repair the rock chip impact point as normal. Cure the resin along the crack using an **Ultra Violet Cure Lamp** or the sun if available.

Clean Up

Remove the curing sheets and scrape off the excess cured resin. Clean the windshield.

Windshield Repair - Overview

What is Windshield Repair?

“Removing air and moisture from a break or crack by vacuum then, using pressure, inject an ultraviolet bonding resin.”

It is accomplished by using a device, which attaches to the glass and forms a seal.

All repair kits do two things.....they suck and blow - create vacuum and produce pressure. The key is to select a system which is efficient and easy to use and learn, that fits your price range, based on numbers of repairs per month you expect to perform.

Equipment

Choosing a kit: **affordability, attachment device, user-friendliness, durability, c - when your customer is watching, does your equipment look professional, if yes, you gain respect and credibility!), quality of materials and seals.**

Remote units such as our Accelerator Kit with a long hose allow greater observation and control. Great in cold climates - you can sit in the vehicle and perform vacuum and pressure cycles in comfort.

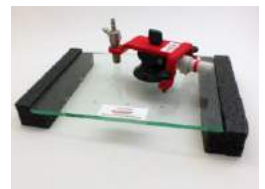
Self-contained units are compact. Can be more affordable.

Note: The repair system, which includes the resin, must achieve **three important results:**

- A **strong, long lasting, non yellowing repair**
- The repair must be **clear and completely filled with resin**
- You should be able to quickly achieve **quality results**

Return on Investment -Cost of equipment vs. usage .5 oz 50 repairs x \$40per repair = \$2,000.00!

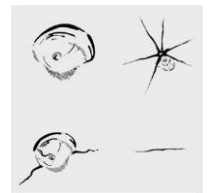
Practice - Consider purchasing our **RepairDemo™** - an 8 ½ x 11 sheet of laminated safety glass with 15 easy chips for you to repair. You will learn how to set up your equipment and gain confidence, setting you up for a successful career!



Note -See our full line up of WSR Kits at www.autoglassolutions.com

Types of Damage

Minor damage can be mended before it spreads or becomes contaminated by water, soil and chemicals from rain repelling treatments and washer fluids. Repair should be attempted *only* when the outer layer of the laminated safety glass is damaged.



Typical rock chips that can be repaired: Bull's eye, star, combination, crack and nicks (chips)...

...if they are smaller than the size of a quarter: Note: When damage is in the **Drivers Primary Vision Area**, use caution when performing repairs. Read and study the *American National Standards of Windshield Repair* for specific guidelines and recommendations. (see our document: **Anatomy of a Windshield**)

Repair time: 15 to 45 minutes to fix and usually leave a small blemish where the glass was broken. The

damage is still there, but it is hidden by the ultraviolet cured resin, which helps hide and keep the damage from spreading.

Billing

You must handle the billing question up front, though and be prepared to handle it in a manner that suits you and your customer.

Sell directly to your customer and get paid in cash, check or credit card. If they want to turn in the claim, they can present your paid invoice.

Many customers will want you to bill the insurance company directly because most insurance companies will waive the deductible amount on the claim, meaning that they will not have to pay any out of pocket expense. This is best achieved by:

Bill insurance companies through a TPA (Third Party Provider). We recommend **eDirectGlass**. They are a great match for start up and small WSR business. You can see their Silver Package on the bottom of the page at this link: <http://www.edirectglass.com/overview.html> Their system seamlessly interfaces with QuickBooks, so no re-entering documents! Call (480) 993-0915 extension 201 to speak to sales. You can even get a 30 day free trial at the link above.



When doing work **for local businesses, they may ask to pay you on a monthly basis** so that they can write just one check. Included in this list is body shops, car dealers, fleet accounts, car rental accounts, trucking companies, municipalities and any company that has multiple vehicles

The Repair Process

Qualifying the Repair

For a repair novice or for fast paced businesses that rely on quick turnover of each vehicle or if you have limited shop space and time to devote to Windshield repair, limit your repairs to small repairs under the size of a quarter. Larger, more complicated repairs or long cracks should be conducted by seasoned technicians. Damage should not include the PVB or inner glass. See *American National Standards of Windshield Repair* for specific guidelines and recommendations. (see our document: *Anatomy of a Windshield*)

Always mention to the client BEFORE you begin the repair process that is very unlikely, but possible that attempting a repair may cause additional damage, especially in the outer 3 inches of the perimeter of the windshield, near the molding. This area of the glass has the most stress and a crack may 'run' when you are attempting the repair. In the other 80 percent of the glass surface it is even less likely that additional damage may occur during the repair process. However, explain to the client that doing nothing about the damage is also a 'choice', and very soon the damage will spread on its own. As a result of heat and cold, requiring an expensive replacement....so it is much better to attempt a repair than to do nothing. Less than 1 repair in 100 will experience additional damage, so the odds are much better in favor of attempting the repair.

Tell your client that most repairs take between 15 and 45 minutes. Make sure that they have the time to allow you to successfully finish the repair. Explain that the repair will NOT disappear, but that it will be **'structurally sound and cosmetically improved'**. This sets the client's expectations at a reasonable level so that they will be satisfied with the repair. Be confident, but honest about the results they can expect. Every chip is different.

Inspection and Assessment

Examine the damaged area from the inside and the outside of the vehicle. Look for hidden cracks, moisture, contamination, age of damage and previous repair attempt.

Determine if the damage is within your technical experience to repair.

Assess to make sure temperature of the windshield is cool to the touch – if possible, move vehicle to a shaded area.

Safety First - be sure to wear safety glasses and nitrile gloves. Wipe up small spills quickly. Consider the use of an acid free resin – skin allergies.

Repair Process

See Instructional DVD or go to: www.autoglassolutions.com to view the training video.

© Copyright AutoglasSolutions®

*Your
Logo
Here*

WINDSHIELD REPAIR Disclaimer

*Your Company
Address
Phone Number
Email
WebSite*

It is very unlikely, but possible that attempting a repair may cause additional damage, especially in the outer 3 inches of the perimeter of the windshield, near the molding. This area of the glass has the most stress and a crack may 'run' when attempting the repair. In the other 80 percent of the glass surface it is less likely that additional damage may occur during the repair process.

However, doing nothing about the damage is also a 'choice'. In time, the damage may spread as a result of heat, cold and body flexing, requiring an expensive replacement. Less than 1 repair in 100 will experience additional damage, so the odds are much better in favor of attempting the repair. Repair also improves the structural integrity of the windshield which is important in the event of an accident.

I have read and understand the above. I hereby authorize [Your Company Name] to attempt a repair on my vehicle's windshield.

Vehicle Yr: _____ Make: _____ Model: _____

Customer Signature: _____ Date: _____

Customer Copy

*Your
Logo
Here*

WINDSHIELD REPAIR Disclaimer

*Your Company
Address
Phone Number
Email
WebSite*

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Shop Copy

Windshield Repair Flyer

Windshield Chip Repair

Any windshield damage should be fixed *immediately*. Because today's small problem can become tomorrow's problem. When left untreated, windshield damage is more likely to spread or crack, causing the need for an expensive replacement.



What is Windshield Repair?

Minor damage can be mended before it spreads or becomes contaminated by water and soil. Repair is possible when *only* the outer layer of the laminated safety glass is damaged.

Above, are pictures of typical rock chips that can be repaired: If they are smaller than the size of a quarter, and are not in the driver's direct line of sight. These types of repairs take about 45 minutes to fix and usually leave only a small blemish where the glass was broken. The damage is still there, but it is hidden by an ultraviolet cure resin, which helps to keep the damage from spreading - we guarantee it!

**Your Logo
Here**

**Your Company
Address
Phone Number
Email
Web Site**

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**Your Logo
Here**

**Your Company
Address
Phone Number
Email
Web Site**

*Your
Logo
Here*

WINDSHIELD REPAIR WARRANTY

*Your Company
Address
Phone Number
Email
WebSite*

Your windshield has been repaired using the best procedures and materials available. For as long as you own your vehicle, should the repair fail (discolor, re-appear, or crack out), we will credit the cost of the repair. Original sales receipt by original purchaser is required.

Date: _____ Technician: _____

Customer name: _____

*Keep this warranty with your original receipt *

*Your
Logo
Here*

WINDSHIELD REPAIR WARRANTY

*Your Company
Address
Phone Number
Email
WebSite*

Your windshield has been repaired using the best procedures and materials available. For as long as you own your vehicle, should the repair fail (discolor, re-appear, or crack out), we will credit the cost of the repair. Original sales receipt by original purchaser is required

Date: _____ Technician: _____

Customer name: _____

*Keep this warranty with your original receipt *

Windshield Repair Business Cards

Business Cards are one the least expensive ways to introduce yourself and **leave a lasting reminder of who you are, and what you do.** So, take your time and develop a card that you will be proud of!

- Business Cards may include **offers and educational information** for your client
- You can find several samples of business cards by **searching Google Images for ‘ Windshield Repair Business Cards ‘.** By looking at these cards, you will begin to get an idea of what should be included in the ad copy. Find out what style/look you feel that expresses **your unique approach to doing business**
- Search online for **free software** that walks you through making your own
- Search for companies that have **stock cards** available for you to edit. **Vistaprint** is one such company
- Consider looking for a **talented friend or family member** who can make your cards in exchange for a windshield repair or two
- **Magnetic business cards** may cost a little more, but they always find themselves on refrigerators - holding kid’s artwork or grocery lists. They can be around for years as a constant reminder of who to call when that stone hits their windshield
- Make sure your business card looks **professional and do NOT forget to leave vital information off your card.**

See the sample card below. It offers all the **critical information** you need to display, **plus some educational information** as well as **an offer**, plus a ‘**call to action**’ in the expiration feature of the offer. Keep in mind that a card with a dated offer may be presented to you long after it’s expired...honor it anytime in the future. Your prospect will respect you!

<p>Your Company Logo Here</p> <p>Windshield Repair</p> <p>Call (000) 000-0000</p>	<p style="color: red;">Broken Windshield?</p> <p style="color: blue;">Why Repair your Rock Chip?</p> <ul style="list-style-type: none"> * Stop damage from spreading * Save \$ - avoid replacement * Avoid leaky replacements * Retains structural integrity <p style="color: red;">\$45 first chip - \$20 2nd +</p>		
<p>FREE! Water Repellant</p> <p><small>(With Windshield Repair)</small></p> <p>Offer Expires ___/___/___</p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Your Name <small>Technician</small></p> <p>Guaranteed <small>Results!</small></p> </td> <td style="width: 50%; vertical-align: top;"> <p>Your Company <small>Address</small></p> <p><small>Phone</small></p> <p><small>Email</small></p> <p><small>Web Site</small></p> </td> </tr> </table>	<p>Your Name <small>Technician</small></p> <p>Guaranteed <small>Results!</small></p>	<p>Your Company <small>Address</small></p> <p><small>Phone</small></p> <p><small>Email</small></p> <p><small>Web Site</small></p>
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On-Site Windshield Repair Training Program

Windshield Repair Training (1-3 Trainees)

Two days, on-site intensive training. Program covers the basics of windshield repair and an introduction to long crack repair, as well as marketing consulting, business planning and billing. Jump start your business by learning from a top industry Technician, Dan Polzin!

Program Outline

- **Why do Windshield Repair? - How it can meet your specific needs**
- **What is Windshield Repair? Understanding the process**
- **Equipment - Understanding the features of your system**
- **Types of Damage - Specific challenges**
- **The Repair Process**
 - **Qualifying the Repair**
 - **Expectations - For you and your client**
 - **Client Communication**
 - **Damage Disclaimer**
 - **Warranty**
 - **Inspection and Assessment**
 - **Accelerator/Velocity/PowerTech or RapidTech Operation Procedures**
 - **Tips and Tricks For Stubborn Breaks**
- **Marketing Tips**
- **Billing Options**
- **Accounting Options**

You will need to purchase a **RepairDemo™ \$39.95 #ARD1486** and have a few cars with chips lined up to work on.

Cost of Program with purchase of any AutoglasSolutions Kit: Airfare, lodging (2 to 3 nights), transportation for trainer to your site plus program fee **\$1,600** (Regular price, \$2,000 - you save \$400 by mentioning this offer!)

Contact Master Trainer/Technician: Dan Polzin at (515) 229-0070