



OPERATION MANUAL

CLASSIC AND ELITE WINDSCREEN REPAIR SYSTEM



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1. HEALTH AND SAFETY (All Repair Systems)

Windscreen repair resins carry an irritation warning label.

Use either protective gloves or use barrier cream to protect your skin from irritation.

Protect your eyes with approved safety glasses. Fragments of loose glass or resin splashes may be harmful to you if they get into your eyes. Resin splashes may be washed out with water and then seek medical assistance immediately.

The curing lamp emits ultra violet radiation. Although the lamp output is in the safer UVA range, you should avoid exposure to skin and eyes. UV protective safety glasses are provided and must be worn when using the lamp.





Health & Safety information is printed on the Resin Insert card supplied with every pack of UV resin, or on the fold out label of larger resin bottles. Full MSDS information is available from Esprit upon request.



The UV resins may be harmful to certain types of paintwork. Take care not to spill resin onto the bodywork. Where possible, the use of a bonnet cover is recommended. If a spillage occurs, then wipe the area clean immediately. Any marks can then be removed by using the pit fill polish with a soft, clean cloth.



DO NOT repair windscreens in direct sunlight. Daylight contains ultra violet light, which will lead to premature hardening of the resin. (Even on a cold cloudy day there is a UV content in daylight).



Always keep chemicals and electrical equipment away from children.

Only use genuine Esprit repair materials with your repair kit. We cannot guarantee the performance of non-genuine materials. Resins from different manufacturers could be initiated with different UV wavelengths and correct curing cannot be guaranteed unless Esprit equipment and Esprit resins are used together.

Technical support is based on the use of genuine Esprit repair materials and equipment only.

Since you will be working on already damaged glass Esprit cannot accept any liability for replacement glass in the case of failure to effect a repair.

When using equipment with trailing cables, especially when extending across public rights of way, the technician must ensure relevant OHS guidelines are followed to prevent trip and slip hazards. Esprit also offers a battery pack (ESPBATT) for use with all of our existing equipment to remove trailing cables.

We suggest that each Repair Organisation or individual technicians identify all potential risks when conducting repairs, such as trailing cables or working at height.



2. WINDSCREEN REPAIRS

All the windscreen repair techniques detailed in this manual are for the repair of laminated glass only. You do not need to determine if the windscreen is laminated, if it is chipped or cracked it must be laminated. Toughened windscreens don't chip, they shatter. The system is NOT designed for the repair of other types of glass and we cannot give any advice or support for any such repairs.

Using Esprit equipment, resins and procedures will satisfy compliance under the new British Standard: BS AU 242b:2022 – the voluntary UK Code of Practice for repair technicians and repair organisations.

Esprit has, on multiple occasions, passed performance testing to BS AU 251:1994 and AS/ NZ 2366.2:1999.

These international standards are based on the mechanical safety tests used on new windscreens under European Regulation, ECE R43, which also provides conformance to the European “Recommendations for Repair of Automotive Glazing” (AFNOR).

bsi. Test Report	
Report No	202700479 Issue 2 This Report consists of 3 pages
Client	Esprit Windscreen Systems LLP 44 Windway Road Plymouth East Industrial Estate Newquay Under Lyme Devon PL7 3RN
Authority & date	BSI Question No 71282 dated 3 November 2006
Items tested	Windscreen Repair Resin (Esprit UV Resin)
Specification	BS AU251:1994
Results	Pass Issue 2 of this report supersedes all previous issues. The amendments on this page giving rise to this issue can be ascertained by contacting the authorising signatory.
Prepared by	S Granger (Team Manager)
Authorised by	F Morrison (Laboratory Manager)
Issue Date	20 January 2010
Conditions of issue	<small>The Test Report is issued subject to the conditions stated in clause 3 of the BSI Code of Practice for the Issue and Use of Test Reports. The information contained in this report is for the specific use of the client and is not to be used for any other purpose. The information contained in this report is not to be used for any other purpose. The information contained in this report is not to be used for any other purpose. The information contained in this report is not to be used for any other purpose.</small>

Test Report		BSI Product Services
Report No	202712842 This Report consists of 3 pages	
Client	Esprit Windscreen Systems LLP 44 Windway Road Newquay Under Lyme Devon PL7 3RN	
Authority & date	BSI Question No 158251 dated 4 October 2007	
Items tested	Windscreen Repair Resin (Esprit UV Resin)	
Specification	AS/NZS 2366.2:1999	
Results	See page 2	
Prepared by	S Granger (Senior Technician (Engineer))	
Authorised by	A D Cole (Laboratory Manager)	
Issue Date	29 May 2007	
Conditions of issue	<small>The Test Report is issued subject to the conditions stated in clause 3 of the BSI Code of Practice for the Issue and Use of Test Reports. The information contained in this report is for the specific use of the client and is not to be used for any other purpose. The information contained in this report is not to be used for any other purpose. The information contained in this report is not to be used for any other purpose. The information contained in this report is not to be used for any other purpose.</small>	

Whilst a check of visual appearance will ensure the repair looks satisfactorily repaired, resin can be hardened without a strong bond to the glass or at a molecular level. Performance testing of Esprit equipment gives the user confidence in the “invisible” qualities of a repair. An Esprit repair will:

- Restore strength to the damaged glass.
- Restore at least 95% of the optical clarity of the damaged glass and minimise distortion.
- Create durable and permanent repairs. The vehicle can be washed or driven immediately after the repair is completed.

Heated windscreens can be repaired in exactly the same manner as unheated windscreens.

Heated and tinted windscreens or tinted top band areas can be repaired in the same manner as plain windscreens.

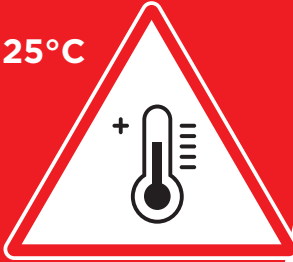
DO NOT repair in front of any windscreen mounted sensors or cameras. These zones may extend beyond the obvious exclusion zone. If in doubt, check with the vehicle manufacturer for information.

Cosmetic improvement: Repairs will restore most of the optical or cosmetic appearance. The size of the blemish left is a function of the severity of the initial damage.

Some heat reflective (Athermic) windscreens may show the special coatings natural colour in any areas of delamination, such as at the edge of a bullseye impact.



25°C



3. PREPARATION

Check the temperature of the glass. The maximum recommended glass temperature for windscreen repair is 25°C

At high temperatures the bond between the glass and the PVB interlayer starts to weaken which can result in a strong watermark or daisy pattern ring around the break if the resin pushes into areas of delamination. (BS AU 242b:2022 specifies a glass temperature range of 5°C to 25°C)

CLEAN



Clean the work area by wiping with a clean cloth or paper wipe that has been moistened with IPA Spray. DO NOT spray glass cleaner directly onto the glass as this may contaminate the break prior to repair.

Esprit E-Spray is an IPA based compatible cleaning product suitable to be sprayed onto the glass (inside and out) prior to repair to enhance adherence of the suction cups to the glass surface. See later for drying and decontamination with E-Spray.

Smear a film of gel onto the suckers of the inspection mirror and fit the mirror onto the inside of the windscreen, immediately behind the damaged area.

In the centre of all damage is an impact point where the stone hit the glass. This impact point is the natural injection point for the repair resin. It is possible that the impact point will be blocked with broken glass and dirt, which will restrict the flow of the resin into the break.



APPLY

IT IS IMPORTANT TO CLEAN OUT THE IMPACT POINT AS FOLLOWS:

First of all, wear protective eye-wear to prevent any glass fragments from entering the eye.

Use the glass probe to gently scrape away any small glass debris pieces.

Gently brush the pieces away with dry paper towel.

This will be ample impact point cleaning for many breaks, but where the impact point is tightly closed drilling the impact point will open it further.

Place a 1mm drill burr (blue box) into the drill chuck and tighten.

Holding the drill with both hands to keep it steady place between upright (90 degrees to the glass) and 45 degrees and drill into the impact point in short bursts.

CAUTION:

When drilling you MUST ensure that:

1. The drill does not go too far into the glass as this may cause permanent damage to the PVB interlayer. The head on the drill burr is a measuring guide and the drill head should NEVER go completely into the glass.
2. Ensure that the moving parts on the drill do not damage the glass around the repair. Hold the drill carefully with a supporting hand to ensure the drill cannot scratch the glass.

Using the tip of the drill burr grind out any dirt and loose glass from the impact point. Gently brush the dust and debris away with dry paper towel.





4. DECONTAMINATING THE BREAK

When moisture and dirt have entered the break, it is important to remove it before commencing the repair.

If there is excessive moisture in the break to the point that the interlayer of the glass has turned milky the break cannot be repaired.

After probing or drilling the impact point spray one squirt of E-Spray into the impact point. The spray will soak into the break and when evaporating away will take moisture and the contamination with it.

In colder weather it may be necessary to use the heater to aid the evaporation of the spray.

5. WARMING THE GLASS

Warming the glass plays two important roles in windscreen repairing

1. Improving the filling of the damage.
2. Drying moisture out of a break before starting the repair.

The Esprit heater is powered by 12v and should always be powered by an external power source. Plugging into modern vehicle electrics has the potential to cause damage.

Pre heat the unit. Hold down the switch on the base of the unit (found under the hinged flap) for approx. 20 seconds so that it is warm ready for if and when you need it later.

The heater is only actively heating the metal disc when the glass switch is pressed.

The red and green LED's illuminate when the unit is connected to a 12volt power supply. The unit is fitted with a 70°C thermal cut out to prevent overheating.

If the cut out activates, the red light remains on but the green light is now off. The unit will now start to cool down, when the temperature drops by 15°C the thermal cut out will automatically re-set and the green light will switch on and the unit will start to heat up again, thus maintaining a working temperature.



Time taken to warm the glass using the heater unit from cold is about 20 seconds. Time taken to warm the glass when the unit is already up to temperature is 10 to 15 seconds.

1. Improving the filling of the damage.

Warming the inside of the windscreen (behind the break) by about 150C will make it easier to remove air from bullseyes and fill tight tips of star breaks.

Connect the unit to the power source and ensure that the red light is on.

Open the unit and hold it against the **INSIDE** of the windscreen with the metal disc behind the damaged area of glass. When held against the glass the on/off switch will automatically be depressed and the unit will start to warm up.



A local area temperature increase of 15-18°C is sufficient. As a general rule, if the glass is too hot to touch with the back of your finger then it is too hot.

NOTE: Excess heating will allow excess heat to transfer to the outer layer of glass, causing this layer to expand, closing up the damage, making the repair more difficult.

Excessive heat can also damage the PVB interlayer which can cause permanent discolouration.

2. Drying out moisture.

If there is moisture in the damage then it needs to be dried out before starting the repair procedure

To dry out a break apply one squirt of Esprit E-Spray to the impact point of the break and allow it to soak in for a few seconds, then open the unit and follow the procedure outlined above EXCEPT that the unit is held against the glass (over the damage) on the OUTSIDE of the windscreen. Repeat the process as necessary, keeping the glass warm, until the damage is dry. This may take some minutes depending on the amount of moisture within the break.



APPLY



6. REPAIR BRIDGE: SETTING UP PROCEDURE

The process of windscreen repair is based on the hydraulic injection of the repair resin into the damaged area. The repair bridge is the device that holds the injector assembly tight onto the glass, creating a good seal between the injector and the glass. It is important to carry out this set up procedure correctly since a poorly set injector will lead to leakage and subsequently low-quality repairing.

Set Up: Elite & Compact Elite Systems.

The injector arm must be positioned so that the location marker on the arm is aligned with the large central location marker on the body (There is one large location marker and two small location markers on the body of the repair bridge).

A smear of sucker gel is placed onto the single black sucker.

Raise the aluminium lever.

The bridge is placed onto the glass with the threaded injector holder over the damaged area and the body pressed down onto the glass.

NOTE - The injector arm MUST be pointing either straight up, straight down or as close as possible to these positions.

ALIGN



OPEN



After pushing down on the body, push down the aluminium lever, tensioning the repair bridge.

An injector barrel is screwed into the threaded hole until it is 1 mm away from the glass. By holding the body of the bridge, it can be moved into position if required, so that the impact point is immediately under the centre of the injector seal.

Now screw the injector barrel down against the glass until the flange at the top of the injector thread (New Grey Injector) is tight against the top of the aluminium collar that the injector screws into, this will create the correct amount of pressure in the spring steel of the frame to press the injector tight against the glass.

For those using the new Stainless Steel injectors or the older black injectors with a UNF thread, screw it down until the front feet on the trihead just move away from the glass, see photo.

If you still use the original Black injector, contact Esprit for an upgrade to the new standard as these are no longer in production.

You are now set up and ready to start filling the damage with the resin. Proceed to Filling the break section.





Metal Injector Shown



7. ULTRA VIOLET SHIELD

Windscreen Repair resin is hardened by Ultra Violet light (365nm). While resin with this curing wavelength can be used indoors without any problem, it is possible when working outdoors for daylight to lead to premature hardening of the resin. To prevent this happening, we recommend covering the repair area during the filling phase of the repair process. The use of the UV shield is also recommended under the industry code of conduct, BS AU 242b:2022

It is not necessary to cover the repair during the setup phase or during the UV curing phase.

As part of our commitment to making the repair process easier we have designed a UV shield for use with the Elite repair bridge.

The Ultra Violet shield simply clips over the Elite Trihead during the filling period thus preventing natural UV light from curing the resin before the break is completely filled with UV resin.

Depending on the position of the bridge on the windscreen, the shield may hinder inspection of the repair. When use of the shield is necessary take extra time to ensure the inspection stage can be fully carried out.

Set up: Classic & Compact Classic Systems

Early Classic bridges have a Red body, later ones have a Grey body.

A smear of sucker gel is placed onto the suckers.

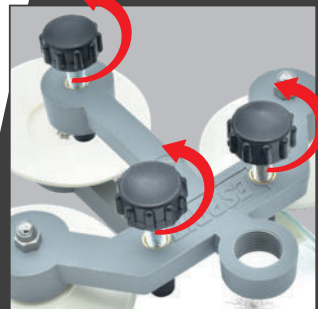
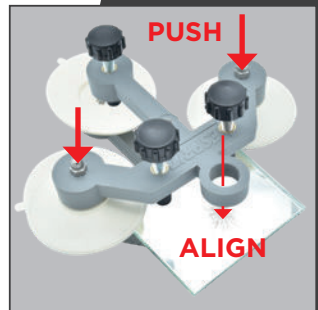
There are three adjusting screws on the basic repair bridge; No.1 is at the end of the long adjusting arm, No. 2 & 3 are a pair of adjusting screws next to the threaded injector holder.

All three screws must be wound back as far as possible (Without pulling the protective caps off the end).

The repair bridge is placed on the glass with the threaded hole over the damaged area and the suckers are pressed down onto the glass.

The long leg (Screw 1) is held down onto the glass and at the SAME time, screws No. 2 & 3 are screwed down until they just make contact with the glass.

Screw No.1 is now screwed in, raising the long arm and tensioning the bridge. The long arm of the bridge should be parallel to the surface of the glass to ensure that the injector is held at 90 degrees to the surface.





An injector barrel is screwed into the threaded hole and adjusted until the tip is 1 mm away from the glass.

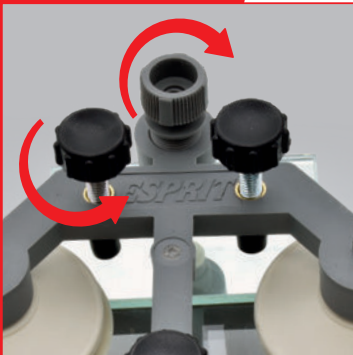
By holding the repair bridge by the sucker mounting points, the whole assembly can now be moved until the impact point is immediately below the injector seal.

Older injectors are black with a UNF thread, Newer ones are Grey with a 14mm thread.

The injector barrel can now be screwed down until the white rubber seal compresses against the glass.

The injector must be screwed down until the adjusting screws No.2 & 3 are just lifted clear of the surface of the glass. (Just enough clearance to allow a piece of paper to slide between the glass and the protective screw cap.)

The final adjustment is to ensure that the injector tip is at right angles (90 degrees) to the glass. Adjust as required using screw 1.



8. BREAK FILLING

This procedure applies to all systems unless otherwise specified. Set up the repair bridge and injector as described in section 4.

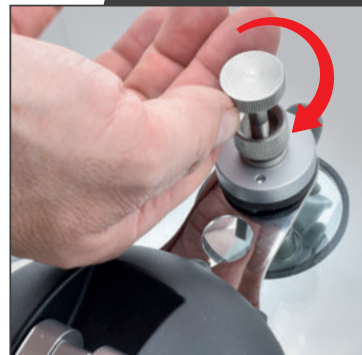
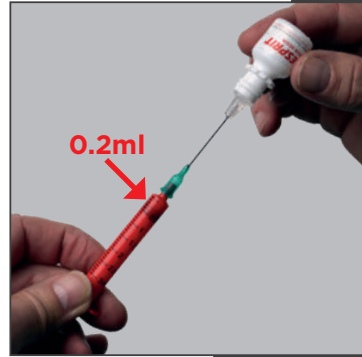
Using the syringe and needle supplied, draw the plunger back to the 0.2 ml marker on the syringe. Insert the needle into the tip of the resin bottle. **DO NOT** press it past the seal. There are two different resins in the kit. The pit fill resin is the thick resin, in the small black bottle and is used for the surface finishing. The windscreen repair resin is in the white bottle (or the large black bottle if the 20ml or 50ml size is used).

Place the needle into the open end of the injector barrel as far as possible and inject the resin into the injector tip.

(See the cleaning notes at the end of this section on how to clean the syringe immediately after use)

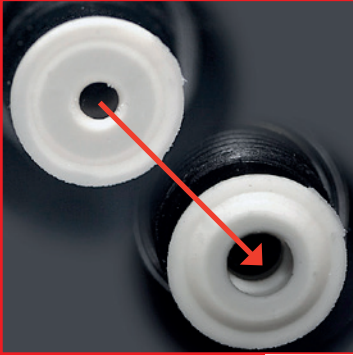
Take the plunger and screw it into the injector barrel. As the plunger is screwed down, it will begin to compress the resin, building up pressure, forcing the resin into the break.

It is **IMPORTANT** to understand when the injector pressure has built up, insufficient pressure will result in an incomplete fill, but excess pressure will cause the seal to blow out. (This blow out is the safety valve to prevent over pressurising the damaged glass)



Metal Injector Shown





To tell when the system is pressurised, we must observe the performance of the injector seal by looking at it in the observation mirror. When the seal is at rest (no pressure) then the white rubber seal is compressed flat against the glass and the dark hole in the middle is small, 2 to 3 mm in diameter.

As the pressure builds up, the seal (looking in the mirror) can be seen to expand and also to lift slightly away from the glass surface. As the seal expands, the central hole will grow to 5 to 6-mm diameter. At 8 to 9-mm diameter you are over pressured and risk a blow out. If this happens, re-set and start again.

When you have pressurised the system, WAIT 3 minutes. Give the resin time to penetrate into the break. (Protect the work area from the Ultra Violet light present in daylight if working outdoors.)

The skills required at this stage are patience and observation i.e. Watch and wait. As the resin is forced into the damaged area, the air is displaced leading to the visual improvement.

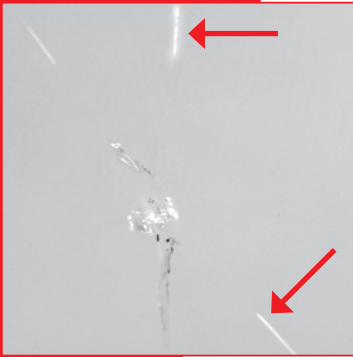
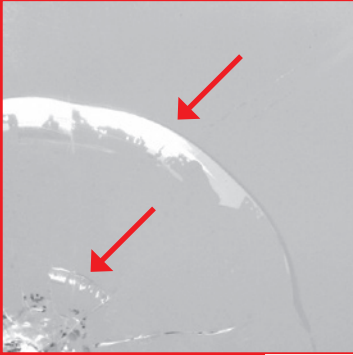
When the break has been under pressure for 3 minutes and the resin seems to have stopped moving, then the plunger is unscrewed about 10 mm, until the thread becomes visible. This will introduce suction on the backstroke, drawing any remaining air out of the damage.

Warm the glass immediately behind the damage. Warm; NOT HOT - you should be able to touch the glass with the back of your finger without any discomfort (see page 9).

NOTE: Advanced users. If you are confident that the break has filled with resin then the warming process can be omitted.

Then repeat the 3 minute pressure cycle followed by 30 seconds pressure off.





Now inspect the damage, looking for areas of air remaining in the damage. (See the picture opposite) If this is the case then repeat the pressure / wait / vacuum cycle until all the air is removed from the break.

IMPORTANT: There is also a correct way to view the damage in order to assess the degree of resin penetration. Uncured or wet resin is not as clear as glass. When the resin is cured its refractive index changes to match that of the glass. We must judge the break with the resin in its liquid state.

With starbreaks and cracks you must look at each leg of the break separately, looking across each break from the side and at a low angle. I.e. A break running north south must be viewed from east or west and a low angle 20 to 30 degrees above the glass, not from above (90 degrees to the glass).

If the damage is invisible or disappears when viewed in the correct manner, then the resin is ready for curing. If part of the damage still shines at you when correctly viewed (usually the tips of the break) then the damage is not completely filled so **DO NOT** cure it. Repeat the filling process as described on pages 11 & 12.

For damage, which will not fill in the normal manner, go to the Troubleshooting section on page 35 for help. A star break is relatively tight compared to a Bullseye and will usually be slower filling. They need more time to let the resin flow into the legs.

A star break is relatively tight compared to a Bullseye and will usually be slower filling. They need more time to let the resin flow into the legs.

9. FINAL INSPECTION

At this point of the repair process, you are not yet committed to the finished process. The point of no return is when the ultra violet light is placed over the repair, curing the resin. Due to this, the final inspection is the most important of the visual inspections.

To make the final inspection, the repair bridge must be moved away from the repair area to give an uninterrupted view of the repair.

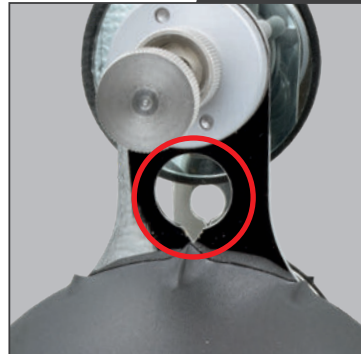
Moving the Repair Bridge for better inspection: Elite & Compact Elite System

Unscrew the plunger to release the pressure. Carefully move the long arm that holds the injector to one side, so that the location marker on the arm is aligned with one of the smaller location markers on the body.

There is a small tab mounted on the front of the injector holder. Lifting this while moving the arm to one side will take pressure off the injector seal, reducing the possibility of damage to the seal as it moves over the impact point.

Caution: DO NOT lift the tab too far or resin may leak from the injector.

Wipe away any excess resin and inspect the break. After inspection, swing the injector unit back into position over the damage, realigning the location markers, and re apply the pressure.



Metal Injector Shown





Moving the Repair Bridge for better inspection: Classic & Compact Classic System

Unscrew the plunger to release the pressure. Carefully move the long arm that holds the injector to one side, so that the location marker on the arm is aligned with one of the smaller location markers on the body.

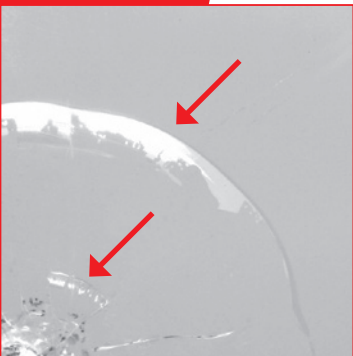
Unscrew the plunger, releasing the pressure. Hold the repair bridge by the sucker mounting points and slide the bridge away. Wipe the area clean and inspect. After inspection, slide the bridge back into position, and re apply the pressure.

After inspection.

If there is still air in the break DO NOT apply the ultra violet light.

Repeat 3 minutes under pressure and repeat warming the glass on the inside of the windscreen.

Read the section on Troubleshooting in this manual for alternative strategies on effecting the repair.



10. FINISH

To finish the repair first take a square of the UV curing film. Then move the injector away from the repair and wipe away any excess resin with a cloth.

Lift one edge of the plastic and put a small drop of pit fill resin over the impact crater, making sure that no air bubbles are trapped in the centre. Let the plastic sheet fall back into position (do not press it down) and cure the resin with the UV light.

UV protective glasses must always be worn when using any UV curing lamp.

Moisten the suckers on the UV lamp and press it onto the glass immediately over the repair area. Switch the lamp on and cure for a minimum of five minutes for a fluorescent tubed lamp or 75 seconds for a LED lamp.

The LED lamp has a timer built into the unit and will automatically switch off after 75 seconds.

This time has been set to ensure the resin cures correctly, and at depth. Although resins may appear hardened, shorter curing times can lead to a weaker bond between molecules and weaker mechanical strength of the repair.



UV TUBE
LAMP



LED
LAMP





After curing, remove the lamp by rocking it sideways to release the suckers. Remove the piece of plastic film.

There should now be a hard piece of cured resin over the impact point, this will have to be shaved back flush to the glass surface.

Take a single sided razor blade and insert it into the holder. (Caution: They are very sharp). Holding it upright, (90 degrees to the glass) move it backwards and forwards over the pit fill resin, shaving it back to flush with the glass surface.



Do not cut the excess resin off with the blade at an angle to the glass as this does not leave as good a finish. Finally, polish the repaired area using the pit fill polish and a piece of very soft polishing cloth to put the final shine on the pit fill area.

The repair is now complete. Clean any marks from the glass using Esprit E-Spray.

The vehicle can now be washed or driven as required without any further waiting.



11. SHORT CRACK REPAIRS: UP TO 150MM - ALL SYSTEMS

Cut a piece off the plastic curing film roll long enough to cover the crack. If the crack is longer than the film, then use several overlapping strips. Place the film over the crack and smooth it down, removing any air pockets from beneath it.

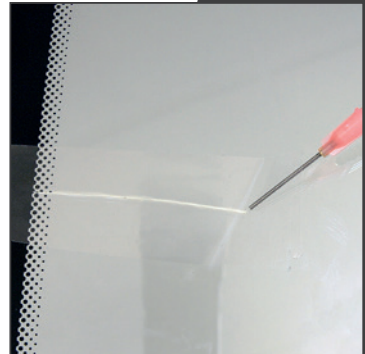
Assemble a syringe and needle and extract 0.2 ml of the windscreen repair resin from the bottle (white bottle).

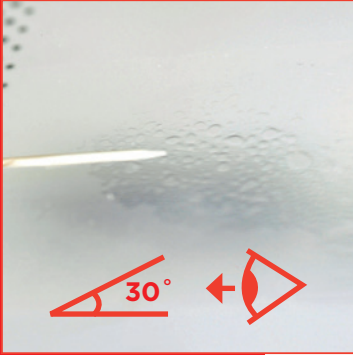
The correct filling technique is to work from the end of the crack (i.e. that part of the crack nearest the centre of the windscreen) outwards, using capillary action to draw the resin into the crack. A small spot of resin is placed under the plastic sheet, immediately over the end of the crack and allowed to soak into the crack (See troubleshooting section for help if required.)

Note: On vertical cracks it is easier to fill from the lowest point on the crack and work upwards.

Continue to fill the crack, putting another small spot of resin over the end of the filled part of the crack and allow time to penetrate. Repeat the process until the crack is completely filled.

(NOTE. Do not put a bead of resin along the crack in one go as this may trap air in the crack.)





Slowly, apply spots of resin, which you will observe filling the crack ahead of the resin application.

Example: If the crack runs across the glass in an east west direction, it must be viewed along the north south axis with your head 6 inches (15 cm) above the glass.

It will now be very obvious where the resin has penetrated into the crack as this portion will disappear, the unfilled portion will still shine.

When viewing the crack from directly above (90° to the glass) you will not be able to differentiate between the filled and unfilled portions of the crack (See picture opposite)

Note: When windscreen repair resin is liquid, it is not as clear as glass. (When cured it becomes as clear as glass.) In order to view the resin flowing into the crack, the correct viewing technique must be used.

This is done by viewing the crack at right angles to its direction of travel and at a shallow angle. (See picture opposite)



UV TUBE
LAMP



LED
LAMP



Switch the lamp on and cure for a minimum of five minutes for a fluorescent UV Tube lamp or 75 seconds for a LED lamp.

After curing, remove the plastic curing film and scrape off the excess resin using the razor blade supplied. Polish with pit fill polish. Finally, clean with glass cleaner.

A crack that was free from dirt contamination will now be almost invisible showing as a faint hairline.

Cracks with dirt contamination will be more visible after repair, as it is impossible to remove the dirt prior to the repair and will show as a dirty line after repair. For this reason, all crack must be repaired as soon as possible.



Metal Injector Shown

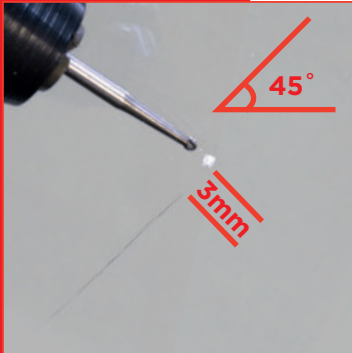




12. LONG CRACK REPAIRS: 150-350MM - ELITE SYSTEM

Long cracks are end drilled for extra stability. This is done, using the more powerful drill and supplied in the Elite & Classic systems (Not the compact range). The filling process is the same as for the short crack.

The first thing to do is to mark the correct position for the drill hole. This should be 3 mm to 5 mm beyond the end of the crack, directly in the line of travel of the crack and on the same side of the glass as the crack (Usually, but not always, the outside layer of the windscreen.). Having identified the correct position, mark it and make a countersink hole for the drilling process at this point.



To make the countersink, put a small drill bur (AD0010 blue box) into the drill chuck and tighten the drill chuck. Set the drill speed to setting 1 (Slow). Hold the drill firmly at an angle of about 45 degrees to the glass and bring the drill head down slowly until it just starts to cut the surface creating a countersink hole.

CAUTION: Do not let the drill slip in use, as it will result in scratches to the glass.

Having produced a location point, we can now drill down into the glass (still using the small bur) by holding the drill at 90 degrees to the glass and applying a light pressure, drilling in 3 to 5 second bursts, lifting the drill out regularly to clear out the hole.



Repeat this process until the hole is close to, but not touching the PVB interlayer.

It is important not to penetrate the PVB interlayer.

Note: For guidance on how deep you can drill you should note that the depth of the crack you are repairing is from the glass surface down to the PVB interlayer. This is a visual reference point that can be used as a guide in order to judge the correct depth of the drill hole.

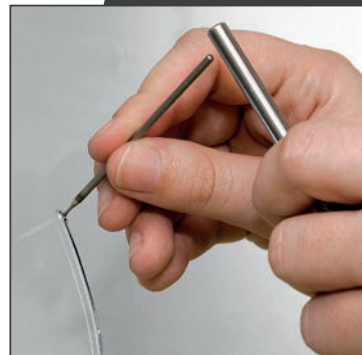
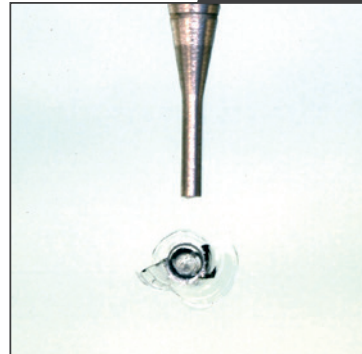
Change drill burs to the large bur (AD0016 yellow box) and enlarge the hole to the same depth.

This will leave a thin layer of glass at the bottom of the drill hole. We will now make a small Bullseye at this point, taking the drill hole down to the polyvinyl interlayer without penetrating it.

To do this, insert the thin end of the slim crack stop punch into the drill hole and hold it in position. Strike the end of the punch firmly but gently with the handle of the steel probe.

You should see a small Bullseye appear at the bottom of the drill hole.

If after three attempts, there is no Bullseye, DO NOT use more force. Drill the hole out a little more and repeat the process.



The Bullseye must now be filled by carrying out a Bullseye repair as previously described, injecting resin into the Bullseye, topping off with pit fill resin and covering with plastic film.

Do not cure the resin at this stage; wait until the entire crack has been filled.

The crack can now be filled as described in the short crack repair section on page 19. (Fill the entire crack in one session and cure by moving the UV light along every five minutes/75 seconds as necessary.)

After curing, remove the plastic sheet and shave off the excess resin. Polish with pit fill polish and clean with glass cleaner.

Note: Cracks longer than 350 mm can be repaired at the operator's discretion.

13. TROUBLESHOOTING

BULLEYES:

Problem: There is air still trapped in the Bullseye.

Answer: There are a number of alternative steps that can be taken if the standard air removal technique does not work. Try these in the order that they are given.

With the pressure on, apply gentle heat to the inside of the windscreen behind the damage and allow the resin to soak into the damage.

DO NOT get the glass hot! When felt with the BACK of your finger, the area heated should be just warmer than the surrounding glass.

The Esprit 12v heater unit is the ideal tool for this job. Heat guns can have a high heat output and must be used with great care. (naked flames such as cigarette lighters are not recommended.)

As this process reduces the amount of trapped air, it can be repeated as necessary when the glass cools down.

Note: The warmer the glass is, the more pronounced the ring surrounding the original damage would be. Avoid excess heating.



It is possible that the impact point is still obstructed, restricting the flow of resin into the break and the removal of the air. Move the injector to one side and drill down into the impact point a little further.

DO NOT PENETRATE INTO THE PVB INTERLAYER.

The air disappears when pressure is applied, but reappears when the pressure is removed. To overcome this problem, the resin can be cured under pressure. Keep the injector plunger screwed down and hold the lamp as close as possible to the repair (normally at 45-degree angle) and cure for one minute from the left side and one minute from the right side of the repair. (LED lamp 3mins for tube lamp) Then apply the pit fill resin, cure, and finish the repair in the normal manner.

Problem: There is a faint ring mark around the finished repair.

Answer: This can be seen in some repairs where the initial impact has pushed the polyvinyl interlayer down, tearing it away from the surrounding glass. The interlayer material has a slightly different refractive index to the glass. The refractive index of the resin is matched to the glass, so that when the resin is injected into the damaged area, it will fill this tear area and show up as a faint boundary ring.

Problem: A Bullseye with a crack running out from it.

Answer: Fill the Bullseye in the normal manner. A short crack may well fill at the same time as the bullseye. See page 19 for the note on how to view a crack in order to judge if it has filled. If both the bullseye and crack have filled, finish the repair in the normal; manner. If the crack has not filled, then fill the remaining crack as normal crack repair and now cure the complete repair area.

STAR BREAKS:

Star breaks are tight compared to Bullseyes and will be slower filling.

If the resin does not penetrate into the ends of the legs of the damage, then the three steps outlined above for removing the air from a Bullseye will work in the same manner. Always allow more time for the resin to penetrate into the damage. Never press the damage from the inside of the windscreen as this can lead to the cracks spreading.

If the star break fills perfectly but when you remove the repair bridge the tension in the glass closes the tips of the star, pushing out resin (creating a sparkle at the ends of the cracks) then replace the repair bridge, refill the break and cure under pressure.



ALL BREAKS:

Problem: There is an air bubble in the pit fill resin after curing.

Answer: Drill out the pit fill resin and repeat the pit fill process. If this problem persists, try warming the pit fill resin before use.

Problem: There is a milky appearance in the repair.

Answer: Old damage, which has been exposed to moisture for a period of time, may result in the polyvinyl interlayer turning opaque. This is a permanent change and cannot be corrected. It should be possible to see this discolouration in the repair before you start by viewing the damage from the inside of the vehicle looking through the damage to a darker background outside the vehicle.

Problem: You have finished the repair and there is still air in it.

Answer: Although remedial action may be possible, it is better to get the repair correct the first time. Always give a critical inspection (pressure off) before curing. It is possible to drill directly into the offending air pocket and fill it in the normal manner. If the air pocket to be removed is larger than the mark left by the extra drill hole, then it is worth doing. If there are many small but separate pockets of air, then remedial action is not recommended.

Problem: The impact crater is larger than the injector seal.

Answer: It may be possible to apply pit fill resin, cure and smooth off. Drill a new hole in the cured pit fill and continue. This is an advanced method and may block the break restricting resin flow following the drilling. You may want to consider this type of damage unrepairable.

Problem: The Resin will not penetrate the crack.

Answer: On curved screens there may be tension pushing the sides of the crack together causing a resistance to resin penetration. If this is the case then set up the repair bridge with the injector over the crack and pressure feed resin into the difficult portion of the crack.

Note: Delamination. Sometimes, moisture will have penetrated the damage and separated the interlayer from the glass around the original damage. When resin is injected into the damage, it will also flow into the delaminated area. After curing this will show up as an uneven transparent line at the boundary of the delamination. This is often referred to as looking like the outline of a flower or daisy pattern. This is unavoidable and is the main reason why damage should always be repaired as soon as possible after occurrence.



14. PARTS LIST

All spare parts for your Esprit system, however small, are available.

Contact your local distributor for genuine Esprit consumables and spare parts.

Resin Products

UV5ML	5ml resin only. (Up to 25 repairs)
UV5PK	Resin pack with injector set, syringe & needle
UV20ML	20ml resin only. (Up to 50 repairs)
UV20PK	Resin pack with 2x[injector set, syringe & needle]
UV5SF	Pit Fill resin (5ml) for filling surface chips.

Resin Sundries

BS0013	Gel. Water based gel for jig suckers.
SA001	Pit fill Polish
EM0018BX20	UV Curing Film in a Box (20)
EM0018R50	UV Curing Film Roll (50m)

Drilling Equipment

ADO010	Tungsten drill bur 0.010 tip (blue box)
ADO016	Tungsten drill bur 0.016 tip (yellow box)

UV Lamp and Spares

LEDLMP12V	12V LED Lamp 2.1mm Lead & Bolle UV Glasses
ESLMPSC	Suckers for UV lamp (Set of 4)

UV Lamp and Spares

ESELBR	12V LED Lamp 2.1mm Lead & Bolle UV Glasses
ESELM1	Suckers for UV lamp (Set of 4)
DVHEAT12	12V Heater / Moisture Evaproator (2.1 Jack Fitting)
EMPROX2.1	Proxxon Drill fitted iwth 2.1mm Plug Lead
EM0011	Classic Bridge Complete (14mm Thread)
AD001	Straight Probe for chip cleaning (Hard Steel)
ADPUNCH	Tungsten tipped crack stop punch. 0.009 tip.
ESLEDW	LED Inspection Torch
ESELSP1	Elite service pack 1 - 3 x rubber feet, 1 foam ring
ESPBATT	Rechargeable Lithium Battery



15. MAINTENANCE

During repairs/ immediately after:

1. The syringe and needle should be cleaned with tissue paper/ blue roll to ensure no resin remains.
2. With the larger amber syringe using the IPA spray is recommended to ensure all resin is removed.
3. The injectors, both plastic and stainless steel, should also be cleaned with IPA spray and tissue paper/ blue roll.
4. Any resin that has come into contact with parts of Esprit repair equipment can also be cleaned using IPA spray and paper towels, although this must be done immediately to have the best chance of removal.

Where kits are used off site or by more than one technician the following maintenance schedule is recommended.

Every 30 days:

A visual check that no parts are missing.

Check that all suckers are in good condition.

Check the use by dates on the resins still have 30 days or longer remaining.

Check the gel and pit fill pot contents.

Add consumables where required for the anticipated next 30 days work.

2. Every 90 days:

In addition to the above, closely inspect condition of suckers on all tools. Replace as necessary.

Check that all components are working as expected.

As well as replacement tools, as a manufacturer, Esprit has a comprehensive stock for the maintenance of all the parts / sub assemblies required for all the specialist repair tools.

NOTES





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