REPAIRCERTNZ
SPECIALIST CERTIFICATION MANAGEMENT (REPAIR) LTD

# TECHNICAL BULLETIN
**# 03 – 2022** (October 2022)

# Correct Aperture Preparation for Bonded Glass

Supporting New Zealand's Repair Certification Industry

## About RepairCert NZ Technical Bulletins

*These Technical Bulletins have been developed to provide 'best practice' guidance for Repair Certifiers, to assist them in ensuring that auto body repairs are carried out safely and correctly. It is also intended that these Technical Bulletins can be used by the wider auto body repair industry.*

*Repair Certifiers should always (if available) be guided by any appropriate OE Manufacturer (OEM) supplied information, methods/procedures, or requirements.*

## Introduction and Purpose of this Technical Bulletin

RepairCert NZ has become aware that a fundamental mistake is being made by a significant proportion of the repair industry when installing or reinstalling bonded glass. Commonly, repairers are refinishing the entire window aperture (including the pinchweld flange areas) prior to the installation or reinstallation of bonded glass.

This practice is incorrect because the presence of plastic fillers, primer-sealers, and top-coats between the pinchweld flange and bonding materials creates weaknesses that could have safety consequences on vehicles utilising bonded glass, which is virtually all of our modern fleet.

This Technical Bulletin is intended to explain why this is a problem, and what the correct aperture preparation is, including:

- pinchweld flange preparation requirements; and
- identifying the appropriate surface coatings for the type of repair being completed; and
- determining the condition (state) of any remaining bonding materials (urethanes), prior to glass installation.

**Diagram 1 below shows the steps (in red) that <u>MUST BE LEFT OUT</u> when fitting bonded glass.**

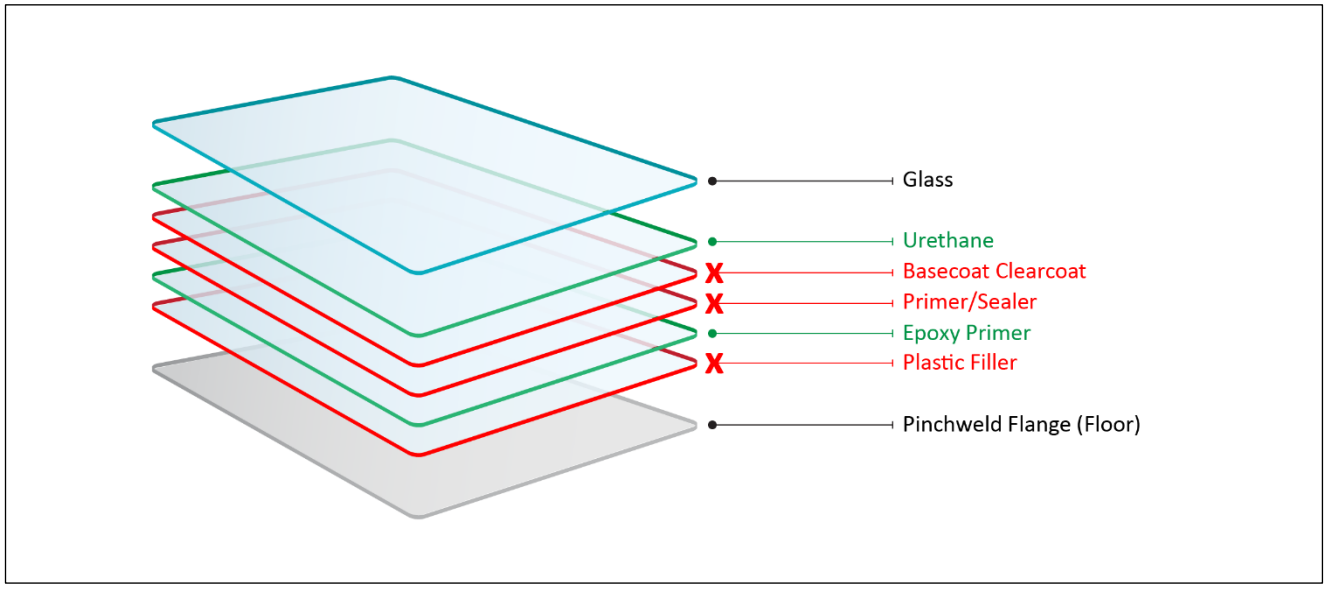


***Diagram 1.***

## Background

Almost without exception, methods of attaching bonded glass in automotive applications involves bonding a piece of glass to a suitably prepared pinchweld flange within a glazing aperture.

While it's a well-known fact that a laminated windscreen is a critical part of a vehicle's structural integrity, as well as being an integral part of crash management and/or Advanced Driver Assistance Systems (ADAS), other bonded glass (rear screens and quarter glasses), also contribute to overall performance, in terms of structural strength and/or crash management, irrespective of the specification of the (typically tempered) piece of glass.

With that understood, the condition of the pinchweld flange areas where bonded glass is attached needs to be consistently 'fit for purpose' after glazing has been removed and refitted/replaced, following a repair. A bonding failure due to incorrect aperture preparation may:

- compromise the overall structural integrity of the vehicle body; and
- result in active and/or passive safety systems not responding in the way the OEM intended, should the vehicle be involved in a future collision event; and
- create water leaks, that have the potential to adversely affect sensitive electronic parts in close proximity (especially safety-related components such as ADAS, and Supplementary Restraint Systems [SRS]); and
- lead to possible corrosion issues developing in the future.

The reasons for bonded glass removal are varied, and will include:

1. glass replacement for damage (cracks and chips as shown in *Image 1*); or
2. removal and refitting for re-finishing operations (especially where masking in-situ processes are not appropriate e.g., lifetime paint warranties as shown in *Image 2*); or
3. removal and reinstallation for panel damage and panel replacement, in the location/proximity of where the glass is fitted as shown in *Image 3*; or
4. removal and re-installation to repair corrosion damage in the area where the glass is fitted as shown in *Image 4*.

Points 3 and 4 above (part replacement/repairs and corrosion) are typical situations where the bonding surfaces (pinchweld flanges) will by necessity be substantially affected and accordingly require different surface preparations.

Any fixed-glass bonding procedure will only be as strong as its weakest link. So, accepting that the correct bonding materials and glass specifications have been determined, the 'grey area' is in identifying what the correct condition of the pinchweld flange that the glass attaches to should look like.

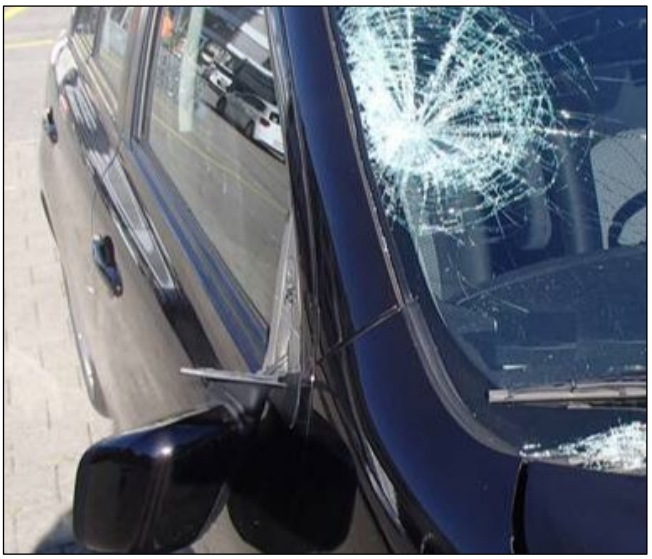

***Image 1.***

***Image 2.***

*Image 3.*

*Image 4.*

## The Specific Problem

Irrespective of whether the glass removal/installation process is carried out in-house or completed by an independent contractor (assuming in all instances that the installer is suitably trained, and is using approved materials and equipment), at the installation phase, the condition of the pinchweld or body aperture is expected to be in an appropriate state for the glass component(s) to be fitted.

Many body shops are 'top-coating' pinchweld flanges in the refinishing process, without realising that bonding performance (adhesion) will be reduced as a result of the lower adhesive strength of non-OEM top-coats.

***At the factory,*** bare metal body shells (including pinchweld flanges) are treated/coated with:

- E-coat (corrosion resistance layer and etching primer); and
- body primers; and
- colour coats; and
- clear coats (predominately).

Importantly, these coatings are cured at elevated baking temperatures of around 140°C.

***When parts are repaired or replaced for body repairs,*** the refinishing processes, while similar to the OEM, will, by necessity, differ in several ways:

- any missing/removed E-coat cannot be reinstated; and
- paint curing temperatures are substantially lower at 65°C to 70°C.

These fundamental differences determine that 1K or 2K primers, 2K solid colour, and Clear Over Base (COB) top-coats, as used mainly in collision repairs/refinishing (combined with low-temperature baking that slows the curing time dramatically) have lower strength, and are unable to achieve the same level of adhesion as the OEM systems.

For these reasons (different paint chemistries and different curing temperatures [time to fully cure]) urethane can be applied over a top-coat during the vehicle manufacturing process, but not during a body shop refinishing process.

This position – that pinchweld flanges should never be top-coated by the refinishing industry – is supported by some OEMs, I-CAR technical bulletins, and glazing subject matter experts.

## The Correct Process

### Correct Pinchweld Flange Preparation

To follow is the correct process for the preparation of the pinchweld flange.

- The pinchweld flange where the urethane will be applied (often described as the 'floor' of the pinchweld flange), must **not** contain any body filler (as these materials have no structural strength). Any surface irregularities (within reason) will be levelled out by the application of the new urethane bead.
- When replacing panels, the factory-applied E-coat (as used on most new, genuine replacement parts), should be retained wherever possible (e.g., only removed at weld sites, or when damaged).
- Any corrosion (rust) repairs in the pinchweld flange area requires the complete removal, neutralisation, or conversion of rust, with no loose or flaking materials remaining.
- Rusted sections that are perforated or heavily pitted (to the extent that the structural integrity of the glass opening aperture is compromised) must be repaired to 'best practice' for rust repair (appropriate replacement materials, correct welding methodology, etc.).
- Irrespective of the rust treatment method, the affected surfaces must be clean, dry, and free of any residual acid materials (as may be found in both neutralisers and converters).

### Correct Surface Coatings

Damaged or removed OEM E-coatings, and all other correctly prepared bare metal surfaces, must be primed or 'sealed' with an epoxy primer. Note that:

- epoxies are extremely durable and proven to create the best adhesion performance to both the (bare metal) substrate, and the top-coat(s); and
- 2K (chemically cured) epoxy primers are preferred over single pack epoxy primers, as they generally cure faster and are more resistant to solvents.

After full curing, the epoxy primer-coated pinchweld flange floor area (where the new urethane bead will be positioned), is masked off to prevent contamination and overspray from sealers and top-coats that will be applied to the body during the refinishing processes *(see Image 5)*.

**THE ONLY COATING TO BE APPLIED TO THE PINCHWELD FLANGE FLOOR IS EPOXY-PRIMER.**

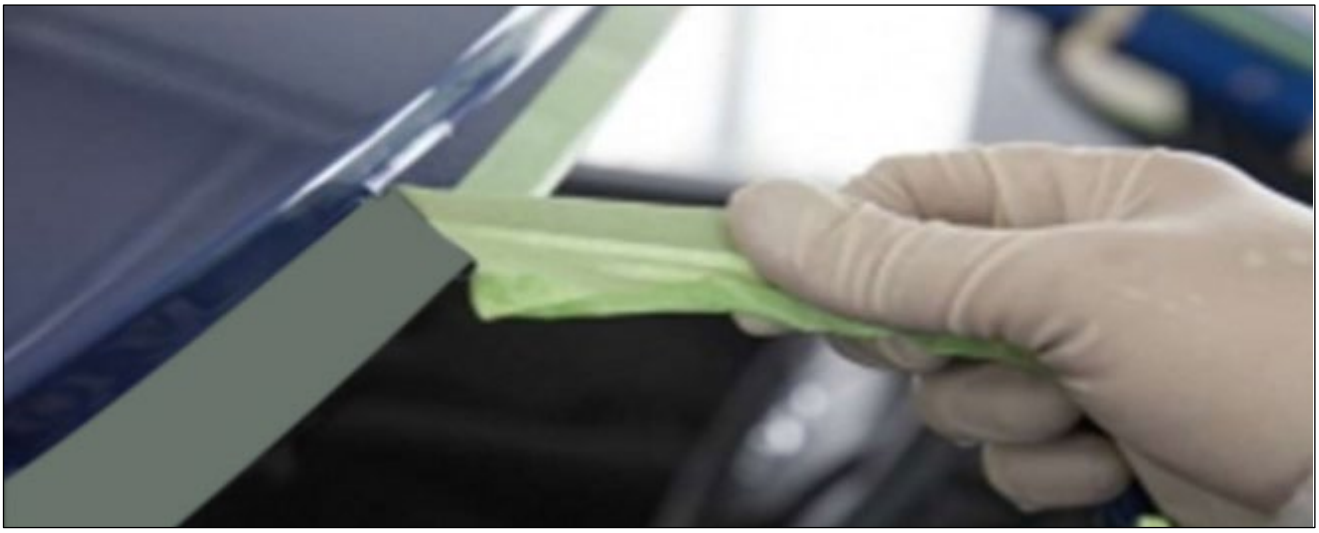

***Image 5.***

### Correct Urethane Bonding Preparation

The correct process for the preparation of urethane bonding is as follows:

- During the removal process, skilled glazing technicians will have cut the urethane joint from the glass side, so as to retain the original adhesive bead on the body side (minimising cuts and scratches on the windscreen aperture).

- This has the added advantage that, for any unaffected (undamaged) areas of the window aperture, the original bond between the adhesive and pinchweld flange, is maintained.
- The retention of the original urethane bead also increases the adhesion performance of new materials when applied directly to the existing urethane adhesive bed - *urethanes adhere best to each other (known as 100% 'bond entanglement')*.
- Whilst throughout this Technical Bulletin the use of materials that may be applied between a pinchweld flange and the urethane is limited to only epoxy primer, it should, however, be noted that a glass installer may, by necessity, apply an adhesion promoter known as 'windscreen primer' or 'pinchweld primer' to the epoxy primer where any new urethane is to be applied, and also over any small bare-metal scratches *(see image 6).*

***Image 6:*** *Note that windscreen primer must not be applied over any existing cured urethane, or used on large bare metal areas. Windscreen primer must be allowed to dry - typically requiring 10 to 15 minutes - before the application of urethane.*

- Directly before the application of new urethane, the original urethane bead is trimmed back to a uniform thickness of 1 mm - 2 mm, cleaned with water, and dried with a clean cloth *(see Image 7).*

***Image 7:*** *Pinchweld flange Inspection and Preparation. Close-cut the original urethane down to a thickness of 1 mm - 2 mm. Clean with water and dry with a clean cloth.*

- The new urethane adhesive bead is then applied either to the pinchweld floor, or to the prepared glass, prior to installation.

## Points to Remember

The following points are very important:

- As shown in Diagram 1 (page1), and Diagram 2 (below), there should be no other coatings between the urethane and pinchweld flange other than epoxy primer.

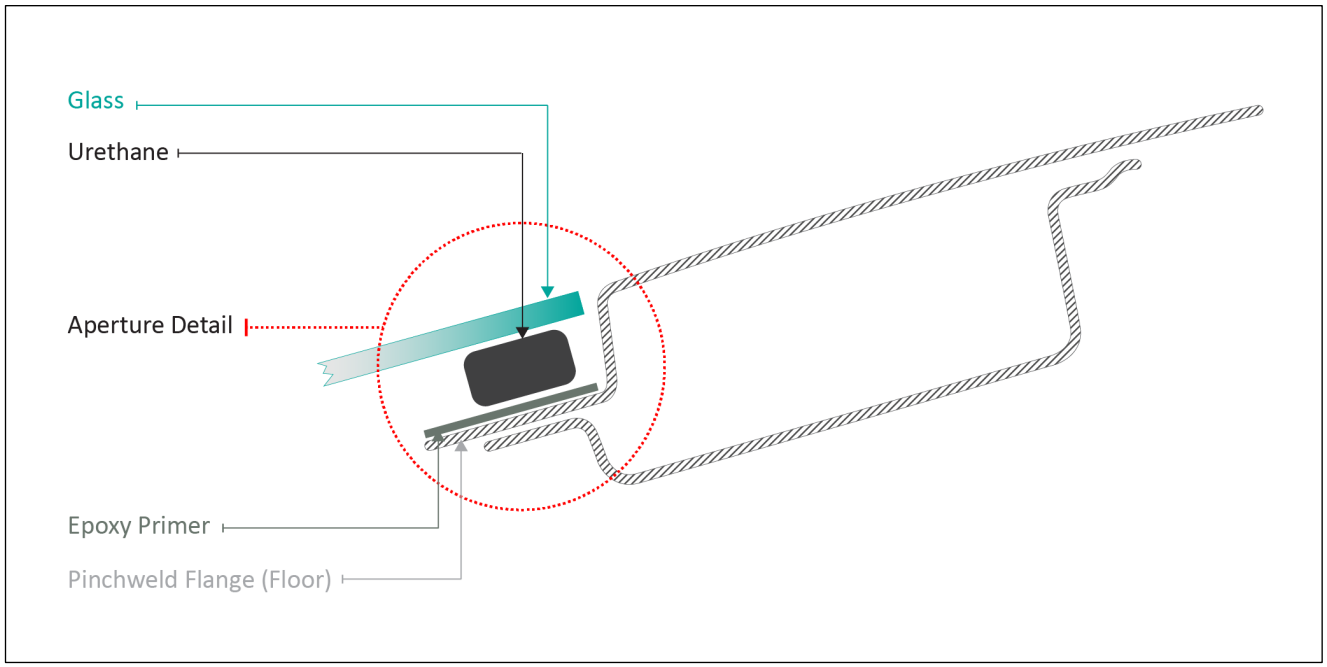


***Diagram 2.***

- All adhesives are only ever as strong as their weakest link. Successful urethane glass bonding relies heavily on selecting the correct surface coating materials, and appropriate preparation and application methods.
- In general terms, most bond failures are the result of incorrect surface preparation (adhesive failure).
- OEM paint chemistry and curing processes provide the best adhesion to bare metals, and have greater strength than those used in the re-finishing industry where the **full** curing time for chemically activated (2K) low-baked top-coats can be up to **90 days.**
- Windscreen glass bonding on ADAS-equipped vehicles may require OEM specified procedures and materials in addition to scanning and calibration. For further information refer to RepairCert NZ *Technical Bulletin #01 – 2022 Advanced Driver Assistance Systems (ADAS).*

**FOR FURTHER INFORMATION PLEASE CONTACT REPAIRCERT NZ.**