

## Aluminium Bolt-On Basics

As more and more motor vehicle manufacturers such as the GM Holden new model VF Commodore use close-out panels made of aluminium, the risk of galvanic corrosion increases.

Aluminium bonnets and boot lids are now common on many vehicles. With addition to these we also see bumper beams and a range of different bolt on parts and panels. This combination of mixing steel and aluminium (see figure 2) is great for reducing the vehicles' weight and this has been successfully mastered at OEM.

However, it does come at a risk if not done correctly when removing and replacing these parts in the aftermarket. Galvanic corrosion also called sacrificial corrosion is caused when dissimilar metals make contact with each other with the presence of an electrolyte. An electrolyte is a non-metallic conductor of electricity such as water. For example if an unprotected aluminium panel comes in contact with bare steel such as a nut or bolt the aluminium will corrode to protect the steel faster and this can result in very costly rework. To prevent this happening we must follow some basic rules when replacing parts

that are of different metal combinations.

Although there are varying methods for attaching aluminium panels and parts to steel such as clinching, hemming, adhesives and a range of different types of riveting, the most common method we face more than any other are mechanical fasteners such as nuts and bolts (see figure 3).

This is where we can leave ourselves open for future problems and to avoid this we need to be sure that we follow the manufacturers' recommendations. If these prove difficult to find, have some basic understanding on what to look out for when working with bolt on dissimilar metal panels.

I imagine in many cases when removing an aluminium or steel bonnet or boot lid the bolts are carefully placed in a container so they don't get lost. Well in many cases some of these nuts or bolts will require replacement and should not be reused.

Steel nuts or bolts will mostly be used to attach



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aluminium parts to the vehicle. These bolts will be coated to act as a barrier between the steel bolt and the aluminium part (see figure 4). Do not reuse a nut or bolt if the coating is damaged. If there is any question of the coating being damaged, replace it with a new one. A “Dacromet” coating (see figure Fig 5) is likely to have been used on these bolts. This is a water based coating containing metal oxides, metallic zinc and aluminium flakes. This is cured at 321 Celsius for 15 minutes and cannot be duplicated once damaged.

Nuts and bolts should be torque tightened to the vehicle maker’s specification when installing. If the fastener is incorrectly torqued the threads could loosen or parts could be damaged from excessive tightening (see figure 6).

To also reduce the risk of galvanic corrosion, plastic or rubber washers may have been used to separate the aluminium and steel parts. It is important that these are replaced or reused when fitting parts. These plastic or rubber washers can often be very thin and difficult to recognise when removing parts, so care should be taken to check if they have been used and always replace with new ones. Only non-conductive materials

should be used, carbon black materials are conductive and products containing this can be found in some plastics and adhesives.

Protective coatings such as refinish topcoats, undercoating and seam sealers also provide a good barrier between the dissimilar metals. These products seal out moisture and air preventing any pollutants that can cause galvanic corrosion.

Aluminium is naturally corrosion resistant due to an oxidation barrier that forms immediately after it is sanded or cleaned then comes in contact with air (see figure 7). This barrier must be removed before any filling or painting can be done. Be sure that any product applied to the bare aluminium is the correct product and check that any sealers or primers are part of the paint system developed for aluminium.

Failure to follow the basic steps required to prevent any galvanic action can result in corrosion of the aluminium around the bolted area.

Given the right conditions this can creep rapidly under the paint surface requiring stripping, conditioning and refinishing the affected area.



Fig 1; VF Holden boot lid

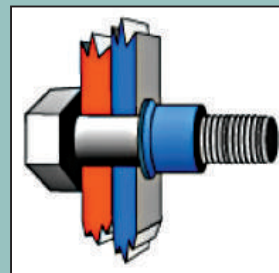


Fig 2; Dissimilar metals



Fig 3; Bolted hinge mount



Fig 4; Protective coated bolts

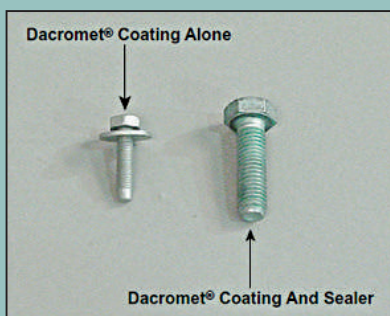


Fig 5; Dacromet coatings



Fig 6; Damaged bolts

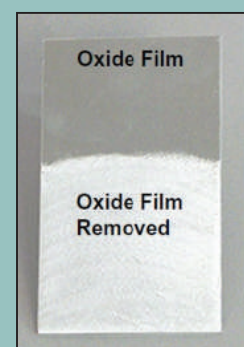


Fig 7; Aluminium oxide film