



## Section 6

# Structure and Body Condition

### Objective:

To ensure the vehicle body is free of protrusions, structurally sound and free from any defects or additional fittings that are likely to increase the risk of bodily injury to any occupant and other road users.

### Australian Design Rules relevant to this section:

- ADR 18 Instrumentation**
- ADR 42 General safety requirements**
- ADR 43 Vehicle configuration and dimensions**
- ADR 44 Specific purpose vehicle requirements**
- ADR 58 Requirements for omnibuses designed for hire and reward**
- ADR 59 Omnibus roll-over strength**
- ADR 63 Trailers designed for use in road trains**
- ADR 64 Heavy goods vehicles designed for use in road trains and B-doubles**
- ADR 84 Front underrun impact protection**

### 6.1 Check exterior body panels and fittings

#### Reasons for rejection

- a) Any item which is not technically essential to the vehicle, protrudes from any part of the vehicle so that it is likely to increase the risk of bodily injury to any person
- b) Any item which is technically essential to the vehicle, is not designed, constructed and affixed to the vehicle in a way that does not minimise the risk of bodily injury to any person
- c) Mudguards are not properly fitted to provide protection over the full width of the wheels and tyres and any mudguard does not extend inboard over the full width of the tyre/s (except where part of the body of the vehicle acts as a mudguard)
- d) The bottom edge of mudguard and/or mudflap at the rear of any vehicle is higher off the ground than 37% of the horizontal distance between the centre of the axle and the mudguard

**Note:** The height of the mudguard and/or mudflap from the ground need not be less than 230mm, or for a vehicle to be used off-road 300mm.

- e) Any motor vehicle which is 2.2 metres or more in width and fitted with a body which is less than 300mm in height at the rear, measured from the lowest point of the body above the ground to the highest point, does not have the rear face of any rear mudguards silver or white in colour

**Note:** Reasons for rejection (e) does not apply when a vehicle is correctly fitted with rear marking plates.

- f) Any vehicle over 12 tonnes GVM manufactured on or after 1 January 2012 is not fitted with front underrun protection (FUP).

**Note:** FUP is not mandatory on heavy vehicles under 12 tonnes GVM or off-road vehicles.

A vehicle is considered to be off-road in relation to the fitment of FUP, either if the wheels are designed to be driven simultaneously, including vehicles where the drive to one axle can be disengaged, or if the following requirements are satisfied:

- at least half the wheels are driven
- there is at least one differential locking mechanism or at least one mechanism having a similar effect
- the vehicle can climb a 25% gradient calculated for a solo vehicle
- at least four of the following six requirements are satisfied:
  - the approach angle must be at least 25°
  - the departure angle must be at least 25°
  - the ramp angle must be at least 25°
  - the ground clearance under the front axle must be at least 250mm
  - the ground clearance between the axles must be at least 300mm
  - the ground clearance under the rear axle must be at least 250mm.

For further information on mudguard requirements, refer to Additional Information – Mudguard and Mudflap Requirements.

## 6.2 Check rear marking plates

### Reasons for rejection

- a) any vehicle with a GVM over 12 tonnes not fitted with retroreflective rear marking plates, except:
- a bus fitted with hand grips or similar equipment for standing passengers to hold
  - a vehicle fitted with conspicuity markings
- b) Rear marking plates are not fitted in locations specified by VSB12

- c) Rear marking plates are faded, damaged or incorrectly fitted.

**Note:** For more detailed information on rear marking plates refer to Vehicle Standards Bulletin 12 (VSB12) National Code of Practice: Rear Marking Plates. A copy of VSB12 may be obtained from the NHVR website at [www.nhvr.gov.au/vehiclestandards](http://www.nhvr.gov.au/vehiclestandards)

## 6.3 Check cabin and body condition

### Reasons for rejection

- a) Any structural member of a body, cabin or chassis such as a cross-member, door sill, pillar, seat or seatbelt anchorage, roof rail and floor panel is cracked, broken or corroded to an extent that weakens the strength of the vehicle or any safety system, or allows the entry of engine fumes into an occupant space
- b) Any cabin, body, sleeper compartment, load carrying area or compartment is loose on the chassis or has missing fasteners
- c) Any load carrying area or compartment is damaged, deteriorated, corroded or distorted so that any part of the load is not retained
- d) Any door, gate, hatch, bonnet or compartment latch, latch control, or hinge is damaged, excessively worn, insecure or inoperative in any latching position
- e) Any body repairs on the vehicle have not been carried out in accordance with recognised industry repair methods and standards
- f) Any item which is not technically essential to the vehicle, protrudes from any part of the vehicle so that it is likely to increase the risk of bodily injury to any person
- g) Any component that adversely affects the safety of the vehicle, and, in particular, obscures the drivers view.

**Note:** For further information on rust and body condition, refer to Additional Information – Rust and Corrosion.

## 6.4 Check number plates

### Reasons for rejection

- a) Any number plate is obscured, for example, by a towing attachment, goose neck or tow ball
- b) Any number plate cover is tinted, reflective, rounded or bubble-like
- c) Any number plate is not issued or approved by the state or territory road transport authority, is damaged or faded to the extent that the registration number is not legible from a distance of 20 metres
- d) The number plates are not substantially parallel to the vehicles axles
- e) Any number plate is fitted to a hinged plate that enables the plate to hinge whilst the vehicle is in motion

- f) Any number plate is mounted more than 1300mm from the ground

**Note:** State or territory road transport authorities may allow a number plate to be attached more than 1300mm from the ground if the design of the vehicle does not allow it to be installed at the required height. For more information about this requirement, contact the state or territory road transport authority.

- g) Characters on any number plate are not clearly visible from a distance of 20 metres at any point within an arc of 45 degrees from the surface of the number plate above or to either side of the vehicle
- h) A rear number plate is positioned so that it is not illuminated by at least one number plate light.

## 6.5 Check electrical equipment

### Reasons for rejection

- a) A warning device (horn) that is capable of providing sufficient audible warning to other road users is not fitted or is not operational or the tone is not of a constant amplitude or frequency
- b) A warning device (horn) is not clearly audible and the actuating mechanism is not located within the reach of the driver in the normal seated position
- c) Electrical wiring or connectors are corroded, damaged, not insulated or are not securely fastened at least every 600mm or are located in such a way that would cause danger to the operation of the vehicle
- d) Electrical wiring is located where it can:
  - become exposed to excessive heat
  - hinders driver or passenger movement
  - come into contact with moving parts
  - cause a fire hazard.
- e) Batteries are not securely mounted, leak or are situated in an occupant space without adequate protection from spillage and fumes.

## 6.6 Check chassis

### Reasons for rejection

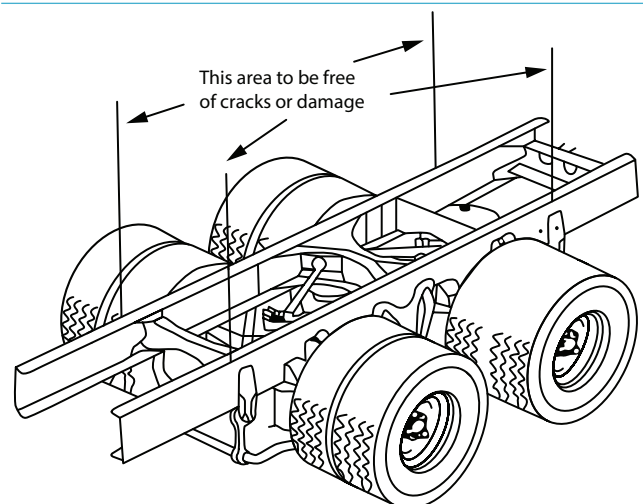
- a) Any part of the chassis or sub-frame is:
  - cracked
  - distorted
  - sagging
  - loose, broken, or
  - affected by extensive or advanced rust.

**Note:** Refer to Additional Information – Rust and Corrosion for a detailed explanation of checking for rust.

- b) Any fastenings between frame members, including welds, are missing, loose, distorted or cracked
- c) Any chassis or sub-frame repairs on the vehicle have not been carried out in accordance with recognised industry repair methods and standard
- d) Frame members in load areas are missing or damaged to an extent that the load area is not properly supported or the members are likely to fall out or contact moving parts
- e) Any vehicle wheelbase that has been lengthened or shortened without certification to Section C and H of VSB6
- f) Body mounting is not done to manufacturers' recommendations, VSB6 or:
  - Body mounting brackets bolted to the flange of the chassis rail
  - U-bolts used, and vehicle does not have a box type frame, or metal spacers are not inserted between the top and bottom flanges of the chassis rail to prevent distortion of the flanges below the U-bolts
  - Wooden runners are used, and they are not protected from damage by the U-bolts by steel capping or shaped spacers under the bolts
  - U-bolts are used, and less than four outrigger brackets or fishplates used, with one on each side of the vehicle at the front and rear.

**Note:** For further information on modifications, refer to Appendix B – Vehicle Modifications.

Figure 6.1 Example of critical structural components



## Additional Information – Mudguard and Mudflap Requirements

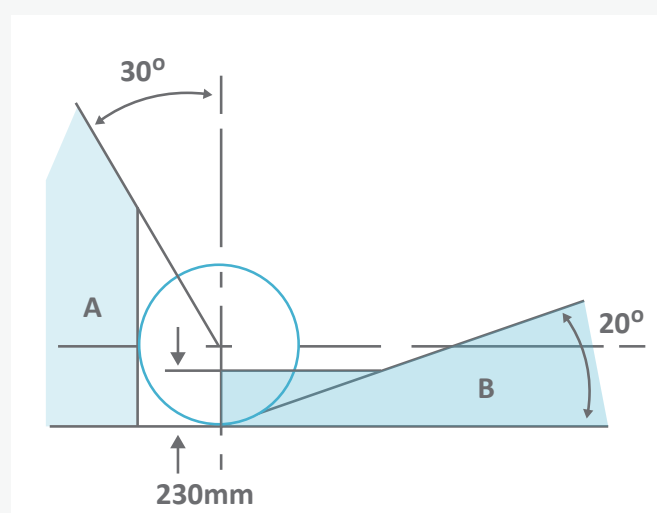
Effective mudguards must be fitted for all wheels on all vehicles. However, this does not apply to a vehicle if the construction or use of the vehicle makes the fitting of mudguards unnecessary or impractical. Examples are:

- pole type trailers used to carry timber
- most road making plant
- some agricultural equipment.

Mudguards and mudflaps must be capable of deflecting downwards any mud, water, stones or any other substance thrown upward by the rotation of the wheels. As outlined in Figure 6.2, mudguards must be fitted to the vehicle in such a manner that provides continuous protection between a point in area A and a point in area B and must be provided for the overall tyre width of all tyres.

Notwithstanding the requirements specified above, the mudguard, including a mudflap (if fitted), does not need to come any lower than 230mm from the ground, or for an off-road vehicle, 300mm.

Figure 6.2 Mudguard and mudflap protection area



## Additional Information – Rust and Corrosion

### Classification of rust

The extent of corrosion in a vehicle can range from light surface rust to the total breakdown of parent metal.

Depending on the individual vehicle's design, there are many different ways in which corrosion can begin and the degree to which a material or structure is attacked can vary widely. In general, though, the formation of rust and resultant loss of metal occurs in areas which retain moisture because of a build-up of road dirt and mud, for example.

In order to simplify identification and classification when carrying out a vehicle inspection, this publication classifies the extent of corrosion in three different stages.

#### Stage 1 - Surface rust

Light, powdery corrosion on the surface of a section of metal is termed surface rust and is sometimes the first indication of corrosion that can be observed; it should warn the owner of the vehicle to take steps for preventing the rust from spreading. Surface rust can occur on or behind any body panel of a vehicle particularly if the protective coating is scratched or damaged.

#### Stage 2 - Advanced rust

Surface rust, if left unattended, will develop into an advanced form of corrosion which can usually be seen as an eruption of oxidised metal, either on bare metal or under paint. This eruption occurs because the rust reaction involves an increase in volume so that pitting or bubbling of paint is the usual indication of penetration.

#### Stage 3 - Extensive rust

The final stage of the corrosion process is the formation of heavy encrustation of oxidised metal which completely replaces the parent metal. This results in a hole or series of holes in the body panel or structural member of the vehicle when the rust is removed. This category of rust can usually only be rectified by replacement of the affected body panels and parts.

### Classification of vehicle structures

Vehicle structural components can be categorised according to their importance to safety. For instance, sub-frames and other basic structural sections have to be absolutely free of rust because their failure could make a vehicle difficult to control and might cause it to crash. As already mentioned, such failures will also probably reduce the chances of survival in a crash.

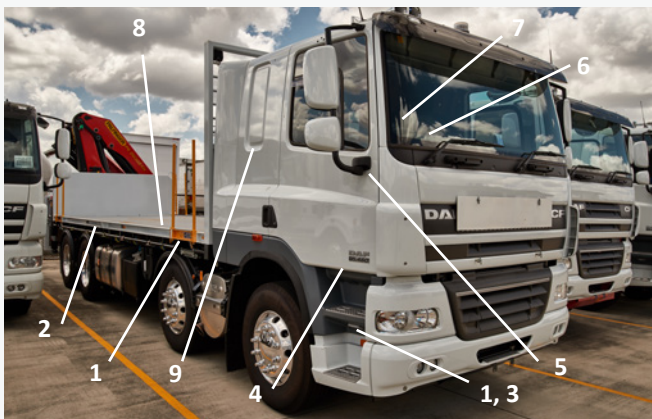
### Primary structure

This category includes any structure or component which, if it collapsed, would make the vehicle uncontrollable or would considerably reduce occupant safety in a crash. Examples of components in this category are illustrated below.

#### Typical primary structure components

1. Main structural members such as sub-frames and chassis rails
2. Suspension mountings and parts
3. Steering component mounting points
4. Door sills and pillars
5. Door hinges and latch mounting points
6. Seat anchorage points
7. Seatbelt anchorage points
8. All floor panels
9. Bulkheads.

Figure 6.3 Primary structure components



### Secondary structure

The second category includes any structure or component which, if it collapsed, would not immediately affect a vehicle’s controllability or the protection provided by its built-in safety systems. Normally, surface rust or advanced rust would not be a cause for rejection in these components but extensive rust is usually either hazardous to persons in or near the vehicle because of its sharp edges or because exhaust fumes can get into the vehicle. In such cases, extensive rust must therefore be rejected. The illustration below shows examples covered by this category.

### Typical secondary structure components

1. Mudguards or fenders
2. Roof
3. Bonnet and doors (areas within 100mm of mounting and locking points are primary structures and must be free of advanced or extensive rust)
4. Exhaust system.

Figure 6.4 Secondary structure components



### Reasons for rejection

The following table summarises the acceptability of rusted components in terms of the categories of rust and structures described so far. Remember that it is a general guide only and that in some cases it might be necessary to depart from the table.

Table 6.1 Acceptability of rusted components

Type of corrosion	Category of structure	
Measure	Primary	Secondary
Surface rust	Acceptable	Acceptable
Advanced rust	Not acceptable	Acceptable (See Note A)
Extensive rust	Not acceptable	Not acceptable (See Note B)

**Note A:** Areas within 100mm of hinges and locks (e.g. bonnet and doors), are considered primary structures and must be free of advanced and extensive rust.

**Note B:** Extensive rust is not acceptable in secondary components if it has resulted in hazardous conditions to persons in or near the vehicle e.g. sharp edges, loose panels or, in the case of exhaust system, gas leaks.

## Inspection method

Visual inspection is usually adequate since advanced corrosion is almost always associated with an eruption of oxidised metal and pitting or bubbling of paint.

However, this method may not be adequate in all cases. In under body areas prone to rusts, such as steering and suspension mounting points and major structural components which include chassis, floor, structural sills and sub-frames, presence of rust should be checked by probing with a rod. This method should also be used to check for presence of rust in other areas where cosmetic damage is not a problem, such as inside wheel arches.

In using this technique, great care must be taken to ensure that sound panels or paint work are not scratched or damaged in any way. It should be remembered that the purpose of such checks is to find out whether rust is present, not to determine its extent.

When checking for advanced rust, you should pay particular attention to seam welds and spot weld. These frequently corrode through from the interior and can result in the eventual detachment of panels. Any panel which is made insecure by such corrosion must be repaired even if it is an area of the component where rust holes are not an immediate danger.

## Repairs

Surface rust on a component or structure is not immediately dangerous and is not a reason for rejection. However, if it is observed, the owner should be advised to have it rectified before it becomes serious. Rectification is simply a matter of completely removing the deposit and applying a rust-proofing coating or oil as is appropriate (body panels should be repainted using a good quality re-finishing system).

It should be noted that repairs made to primary structure components solely by using body filling compounds are not acceptable. However, plastic filler or fibreglass can be used to smooth a non-structural component. A vehicle must not pass an inspection if it is found that a repair to a primary component is carried out by methods which do not restore the original strength of the component or part. A good way to check for continuity of structure if a fibreglass repair is suspected, is to run a magnet over the surface.

Extensive rust in structural members can only be repaired by replacing the affected member or by completely removing all rusted material and reinforcing it so that the original strength of the affected structural member is re-established.

Where a primary structure is found to be in need of repair and the repaired component would normally be coated with a bituminous coating or covered by another vehicle component such as a seat or a floor mat, it is quite in order to ask the owner to resubmit the repaired vehicle before the repairs are obscured so that the adequacy of the repairs can be assessed. A note to this effect should be made on the inspection report if this is required.