

# Light Vehicle Frontal Protection Systems

## Safety Considerations

In this document, the term **Vehicle Frontal Protection System (VFPS)** includes bull bars, 'roo bars' and 'nudge bars'.

The purpose of this Fact Sheet is to assist in understanding the companion Fact Sheet **Light Vehicle Frontal Protection Systems: Design and Construction**

### BACKGROUND

For many years, a VFPS has been accepted as an accessory for most vehicle types, often fitted to help protect a vehicle in the event of a crash with an animal, such as a kangaroo, by reducing the potential for damage to the cooling system and leaving the vehicle stranded after an impact.

However, when a poorly designed VFPS is fitted to a vehicle, it can be dangerous to vulnerable road users such as pedestrians and cyclists in the event of a collision.

In addition, the continued development of vehicle technology and ongoing improvements in vehicle safety systems have led to a situation whereby the fitting of a non-compliant VFPS may actually interfere with the sophisticated safety systems designed into modern vehicles.

A great deal of research has been conducted into the possible effects of a VFPS in a collision and ways of optimising their design. This document has been produced following detailed technical investigations. It supports and builds upon the information contained within *Australian Standard AS 4876.1-2002 Motor vehicle frontal protection systems Part 1: Road user protection*, which primarily addresses the issue of minimising the risk of injury to pedestrians as a result of colliding with a vehicle fitted with a VFPS.

### SAFETY

#### Pedestrian Safety

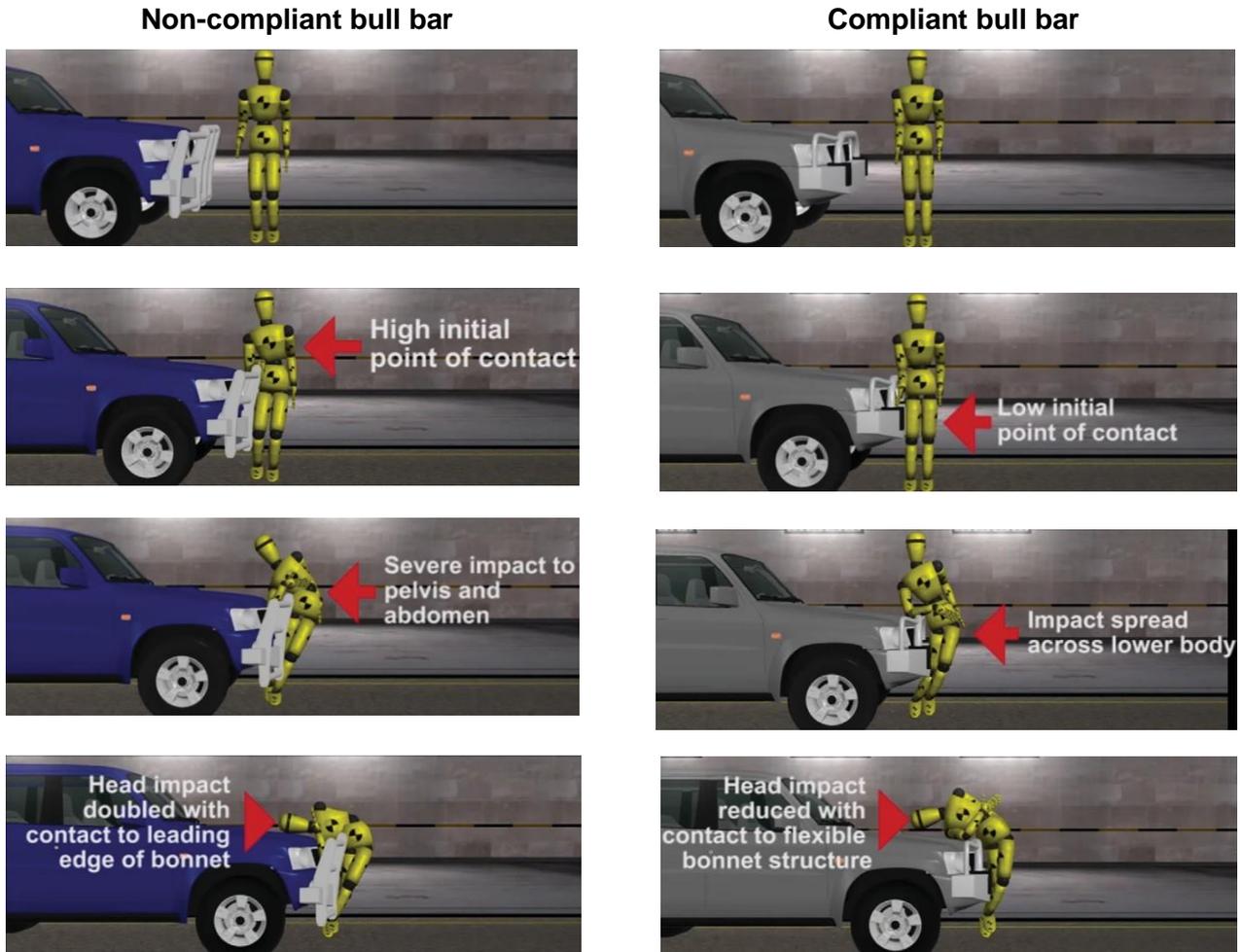
Accident statistics, confirmed by scientific studies, have shown that a poorly designed VFPS greatly increases the risk of injury to a pedestrian hit by a car, even at relatively low speeds.

Generally, the severity of injury is minimised when the pedestrian rolls onto the bonnet of the car. The chances of this happening are better if the point of initial contact between car and pedestrian is as low as possible. One of the risks posed by a poorly designed VFPS is that it will raise the point of initial contact and thereby increase the severity of a pedestrian injury.

For vehicles fitted with a VFPS, laboratory testing has confirmed the importance of VFPS design to the outcomes of a pedestrian collision. The images below, taken from a computer simulation conducted by the

Centre for Automotive Safety Research (CASR) at the University of Adelaide, demonstrates that a compliant VFPS results in lower pedestrian head impact speeds with the vehicle, reducing the severity of the impact and resulting in a reduction to the risk of a serious head injury by well over 50%.

Because the non-compliant VFPS presents a higher point of initial contact, the pedestrian is pushed forward and bent around the top of the VFPS, rather than being swept onto the bonnet of the car, resulting in a much higher risk of spinal, pelvic and head injuries to the pedestrian, even at relatively low collision speeds.



## Vehicle Occupant Safety

Over the last few years, there have been significant advances in the on-board safety systems fitted to new vehicles. The continued development of vehicle technology and ongoing improvements in vehicle safety systems have led to a situation whereby the fitting of a VFPS may actually interfere with the sophisticated safety systems designed into modern vehicles.

The main causes of concern are outlined as follows:

- **Incompatibility with vehicle air bags**

A poorly designed VFPS may affect the triggering of the airbag sensors in the event of a crash, causing the air bags to activate at the incorrect time. In the worst case, this can cause significant additional injury to the occupant.

- **Nullification of crumple zones**

Modern vehicles have crumple zones that protect the occupants by cushioning the impact of a front-end collision. A poorly designed VFPS has the potential to make the front end of the vehicle significantly more rigid, thereby reducing the effectiveness of the crumple zones. This causes a more severe impact for the occupants of all vehicles involved.

- **Incompatibility with other vehicles**

At an international level, significant research is being undertaken towards improving the “crash compatibility” between vehicles involved in vehicle-to-vehicle collisions. The aim of this research is to design vehicles in such a manner that maximises each vehicle’s ability to absorb crash energy. A poorly designed VFPS can negate these design features, thus increasing the risk of more significant injuries to the occupants of other vehicles involved in the collision, than would have been the case had the colliding vehicle not been fitted with a VFPS.

### **Safety Rating of a Vehicle fitted with a VFPS**

It is recommended that consumers seek written assurance from the supplier, signed by a responsible person, that the VFPS is compliant with *AS 4876.1-2002 Motor vehicle frontal protection systems Part 1: Road user protection*, and that the vehicle, when fitted with the VFPS, continues to comply with all applicable Australian Design Rules, including:

- *ADR 13/00 Installation of Lighting & Light-signalling Devices on other than L-Group Vehicles*
- *ADR 69/00 Full Frontal Impact Occupant Protection*
- *ADR 73/00 Offset Frontal Impact Occupant Protection (where applicable).*

The VFPS manufacturer must be able to provide evidence for these claims.

### **Acknowledgements**

The Department for Infrastructure and Transport would like to thank the Western Australia Department of Transport, the Australian Automotive Aftermarket Association, and the Motor Trade Association Western Australia for their assistance in the development of this Fact Sheet.

#### Further information

Call 1300 882 248

Visit [sa.gov.au](http://sa.gov.au)

Email: [vehiclestandards@sa.gov.au](mailto:vehiclestandards@sa.gov.au)

This fact sheet is provided for information only. The information and data on this fact sheet is subject to change without notice. The Government of South Australia may revise this information at any time by updating this factsheet.

