



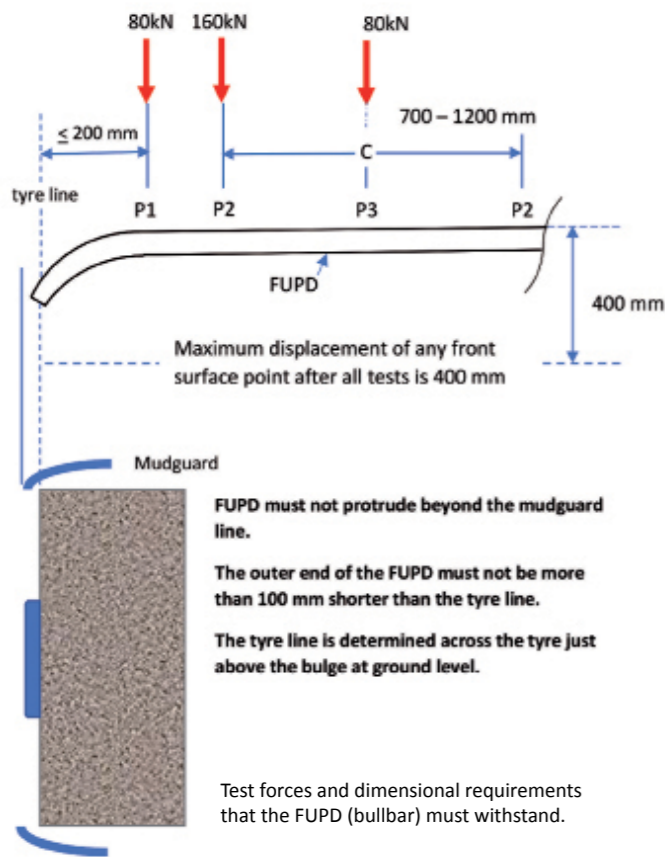
PETER HART

## Front Underrun Protection and Bullbars

Many trucks have bullbars attached. This article considers their legality. Since January 2012, all new heavy duty (GVM > 12t) trucks must have a front under-run protection bar. The Original Equipment Manufacturer (OEM)

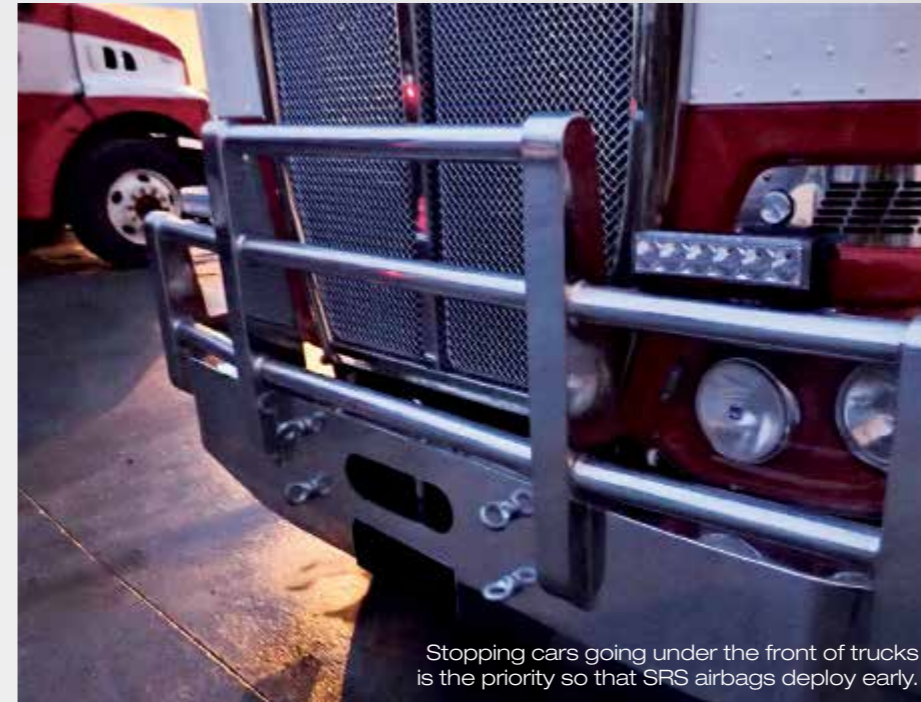
usually do not provide bullbars so their fitment in the aftermarket must maintain the front underrun protection status. In the 1980s, when I worked as an engineer at Kenworth, the thinking was that the front of trucks should be soft and rounded. If a car hit the front it might be deflected out of harms' way. The widespread use of airbags meant a change for the thinking of occupant protection in cars. Now the best strategy was to stop cars from going underneath the front of the truck and let the airbags do the protection work.

The front underrun protection requirement is in Australian Design Rule ADR 84. It is based upon UN ECE Regulation 93. ADR 84 requires that a continuous barrier be provided at the front that can withstand crash forces. The test standard is shown in the diagram. When a force of 80 kN (~ 8 tonne force) is applied to points P1 and P3, the distortion of any point at the front of the vehicle shall not exceed 400 mm. Then a force of 160 kN (~ 16 tonne force) is to be applied at point P2 and again no point from the front of the vehicle shall be pushed more than 400mm from the front. The test procedure allows a pad to be used to spread the load around each of the test points. It is implicit that the FUPD must not break during the test. The height of the test points P1 and P2 must not exceed 445 mm when the vehicle is unladen and the ground clearance must be no more than 400mm. There is no forward protrusion limit. A FUPD and therefore a bullbar must not protrude outside the mudguard line and be no more than 100mm short of that line. Note that fitting wide base tyres on a front axle could change the legality of the FUPD. Points P1 and P2 can be nominated by the manufacturer. The two points of P2



Type	Horizontal angles	Vertical angles
Dipped beam headlamp	+45° (outwards), -10° (inwards)	+15° (up) -10° (down)
Main beam headlamp	+5° (outwards), -5° (inwards)	+5° (up) -5° (down)
Front direction indicator lamp	+80° (outwards), -45° (inwards)	+15° (up) -15° (down)
Front fog lamp	+45° (outwards), -10° (inwards)	+5° (up) -5° (down)

Lamp visibility angles referenced to the lamp centre line that the bullbar must not obscure (ADR 13/00).



are likely to be the attachment points for the bar. P2 is likely to be directly in front of the chassis rails because that is the strongest point. The bar is called a front underrun protection device (FUPD). It must have a structural beam that is at least 120mm high. Compliance with the rule is established with the bar and its support brackets in place. Therefore, the new-truck compliance with the rule depends upon the FUPD that was tested being in place. When a bullbar is fitted, the manufacturer's FUPD will usually be removed. The National Heavy Vehicle Regulator has issued draft modification codes H6 (Installation of an approved FUPD) & H7 (Installation of an unapproved FUPD) that it foreshadows will be added to the National Heavy Vehicle Modification Code (VSB6). These codes deal with the issues arising when a bullbar is fitted to a truck, which are: FUP strength, lighting visibility, width and dangerous protrusions. At present the H6 & H7 codes are advisory. Despite there being no mandatory codes in VSB 6 for the fitment of a bullbar, the vehicle must continue to comply with the Australian

Design Rules. Therefore, the installation should be inspected by an Approved Vehicle Examiner (AVE). Front Underrun Protection Device manufacturers can obtain an approval in the Federal Road Vehicle Certification System for a FUPD/ bullbar. The approval type is current termed a Component Registration Number (CRN); however, it will soon be termed a Component Type Approval (CTA). A plate should be affixed that identifies the CTA number and declares compliance with ADR 84. This plate is likely to be truck-model specific. The CTA approval cannot account for mounting height on the truck or for shading of headlights and direction indicator lights because these requirements are installation-specific. Hence the need for an AVE to inspect and approve the installation. The strength of a bullbar must be certified if it is to be fitted to a truck that was manufactured in 2012 or later. The test is the responsibility of the bullbar manufacturer. The bullbar must withstand the forces shown in the diagram when it is affixed to

an immovable wall via the standard mounting points. The bar must not break. If the original FUPD is removed, it is the responsibility of the modifier to ensure that the installed bullbar that replaces it would pass the force tests in ADR 84 if it were tested. Therefore, modifiers should only fit bullbars that are certified and plated by the bullbar manufacturer as an approved FUPD. The bullbar must be fitted with its approved mounting brackets that must attach to the original FUPD installation points on the truck. Then there is a justifiable claim that the installed bullbar would pass as a FUPD if it were tested.

ADR 92 External Projections, requires that external protrusions be designed so they minimise the risk of injury to road users. Forward-facing hooks and sharp edges, in particular, are unacceptable, especially on bumpers (or bullbars) that are not turned towards the body at the ends. NSW has a technical specification for light-vehicle bullbars called Requirements for frontal protection systems fitted to light vehicles, V1 September 2019. This references AS 4876. While it is not directly applicable to truck bullbars and FUPD, the principles expressed should be considered by bullbar manufacturers. The bullbar elements must be outside the region bounded by the indicated angles referenced to the centre of the lamp. Lighting visibility angles [see table] are often infringed when a bullbar is installed. Additional direction indicator lights will often need to be installed in the bullbar. Getting a bullbar to comply with all the requirements is challenging!

Dr. Peter Hart,  
ARTSA

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