NATIONAL CODE OF PRACTICE

VSB6

Heavy Vehicle Modifications

CHANGE TABLE

Contents

This change table outlines all major changes made in Vehicle Standards Bulletin 6 – Version 3.

A major change is considered to be the interchange of a requirement with a recommendation or vice versa, an addition or removal or a requirement or recommendation.

VSB6 Introduction

The VSB6 Introduction includes a list of the applicable legislation that may be referenced in VSB6 as well as:

- Details on:
  - Implementation
  - Availability
  - Compliance requirements
  - Retention of records
  - Precedence of ADRs and manufacturer's guidelines
- Appendices covering:
  - The contents of VSB6
  - Glossary including definitions and units of measure
  - Referenced documents

General Changes

Formatting (General)

- Established two column format to reduce manual length and provide more information per page.
- Applied minimal set of MS Word styles consistently.
- Reformatted forms/checklists to occupy fewer pages and minimise text entry (i.e. ticks and crosses, rather than writing Yes/No/NA).
- Applied clearer and more frequent headings to help navigation.
- Collate requirements/recommendations that are applicable to all modification codes into the overview of each section.
- Move all modification code specific requirements/recommendations to specific modification code.

Editorial (General)

- Applied active tense throughout.
- Restructured text to establish predictable and parallel patterns (i.e. using tables and tabular layout), similar headings for all modification codes where possible and so forth.
- Applied clear distinction between required and recommended actions.
- Moved requirements stated in introduction to specific modification codes to which they apply.
- Where requirements apply to multiple codes, restated requirements appropriately.
- Introduced an automatically generated table of contents at front of each section.
- Ensured checklist content paralleled content of mod codes.

Technical

- Added advice on how vehicles with advanced braking systems should be modified.
- Added Certification procedure to assist vehicle owners, modifiers and AVEs on understanding the steps of modifying and certifying a vehicle.
- Added references identifying the precedence of ADRs and manufacturer's guidelines over the requirements of VSB6.

Section A - Engines

A-Overview

- Expanded scope to cover all modification codes.
- Added description of each modification code.
- Added ADR 70/.. and 80/.. to all list of ADRs applicable that may be affected by modifications covered by this section.
- Clarified that the vehicle must continue to comply with the ADRs applicable at the time of manufacture or later.

A1-Engine substitution to heavy motor vehicles

- Extended scope to specifically include the installation of a replacement engine that meets later ADRs than those applicable at the time the vehicle was manufactured
- Removed specific mention that certification is not required for installation of a replacement engine of the same make, model and size as supplied by the vehicle manufacturer as original equipment.
- Added specific mention that the installation or conversion of gaseous or other alternative fuel systems for use by the vehicle engine is not covered.
- Added specific requirement to ensure that systems required to meet ADR emission levels, such as selective catalytic reduction (SCR), exhaust gas recirculation (EGR) or diesel particulate filter (DPF), are installed in accordance with the engine manufacturer's guidelines.
- Added specific requirement for pre-ADR vehicles to ensure when a vehicle that pre-dates the ADRs is fitted with an engine manufactured to meet an emission related ADR, retain and operate all the emission control devices fitted to the engine after installation, even though the original engine and emissions design, and ADR approval may be related to another vehicle category.
- Clarified that the air induction and exhaust design criteria are the manufacturer's design criteria.
- Added requirement to obtain from the engine manufacturer the maximum back pressure levels allowed for the diesel engine to comply with ADR 30, 30/.. or 80/.., and adhere to these.
- Added the following recommendations on how to measure back pressure with the engine operating under rated load conditions:
  - On a non-turbocharged engine, the back pressure should be measured as close as possible to the exhaust manifold and at least 300 mm downstream from a bend.
  - On a turbocharged engine, the back pressure should be measured within 150 mm of the turbo outlet and in line with the neutral axis of the upstream bend.
- Changed the requirement to select an engine based on economics, type of operation and service conditions to a recommendation.
- Clarified the following replacement engine items are requirements not recommendations:
  - Ensure vehicle components such as brakes, front axles and suspension have a suitable capacity or, when the replacement engine is heavier than the optional engines specified by the vehicle manufacturer, are upgraded as required and in accordance with VSB6.
  - Ensure the power and torque of the replacement engine does not exceed the capacity of the vehicle driveline.
  - For a diesel engine, install an engine stop control as per ADR 42/.. to prevent the engine being started accidently.

- Expanded on existing requirement for vehicle to meet the gradeability requirements to: the lesser gradeability and startability requirements of either the manufacturer or VSB6 modification codes S3, S8 or S9.
- Expanded existing requirement for where an engine is replaced that the compressor if also replaced is replaced in accordance with VSB6 Section G – Brakes.

- Added the following replacement engine requirements:
  - Ensure that the weight of the replacement engine does not cause the masses on the vehicle (such as the centre of gravity) to change so that any component (such as brakes, axle capacity or suspension) exceeds the lesser of:
    - jurisdictional legal load limits (unless specifically exempted by the relevant heavy vehicle regulator); or
    - the manufacturer's prescribed component limits.
  - If necessary, you may need to upgrade the affected components in accordance with VSB6 to meet the new masses.
- Added the following replacement engine recommendations:
  - Recommendation that the manufacturer's specifications be checked has been made a requirement.
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    Recommendation that the engine be checked to ensure it fits without major modification has been made a requirement, with the added exception of where the modifications are performed and certified in accordance with the relevant sections of VSB6.
- Requirement for the engine to be mounted with vibration isolation has been made a recommendation.
- Changed recommendation that engine mounts should be designed to withstand loading to a requirement and added that the mounts are to be suitable for automotive use.
- Added requirement to ensure all removed cross-members are replaced with original manufacturer-supplied like-for-like cross-members or cross-members compliant with VSB6 Section H — Chassis.
- Added requirement that the engine has adequate clearance including between the engine and chassis/cab components to accommodate engine movement.
- Changed existing cooling requirements to recommendations.
- Clarified Fuel System requirements by including references to the manufacturer's specifications.
- Added requirement to Adhere to the manufacturer's specific requirements for the engine's fuel system, including filtration, cooling and water removal.
- Added requirements to ensure the fuel system meets the requirements of the engine manufacturer, including fuel filtration and suction lift.
- Updated references to Compressed Natural Gas (CNG) to Natural Gas (NG) to align with updated Australian Standard.
- Expanded requirement for emission testing of diesel engines converted to run on alternative fuels other than LPG or NG in isolation to allow for testing to ADR 80/.. .
- Added note to clarify who the responsible regulators are for gas fuel system conversions.

A2-Air cleaner substitution or the fitting of an additional air cleaner

- Clarified requirement for all vehicles to be fitted with an appropriately sized cleaner by specifying "if required by the manufacturer".
- Clarified that the air induction design criteria are the manufacturer's design criteria.
- Requirement to consider operating conditions and service intervals when determining the air cleaner have been made a recommendation.
- Requirement for all joints in the air system to be airtight has been made a recommendation.

A3-Turbocharger installation

- Clarified that the air induction and exhaust design criteria are the manufacturer's design criteria.
- Added the following compliance requirements:
  - Ensure the vehicle meets ADR 28/.. or ADR 83/.. requirements and perform testing if necessary to confirm ongoing compliance.
  - For vehicles certified to ADR 70/.. or ADR 80/.., ensure the vehicle continues to comply with emission requirements either by comparison to an identical vehicle or by physical testing.
  - Ensure intercooling (after-cooling) does not adversely affect engine durability or compliance with emission requirements.
- Duplicated the following installation requirements from the existing A3 checklist:
  - Ensure all fuel lines are secure and clear of the exhaust and turbocharger systems at all times and provide adequate protection from excessive heat for all hoses, electrical harnesses, rubber or plastic components.
  - Ensure the engine air induction system maintains compliance with ADR 30/.., 70/.. and 80/.., as applicable, by matching the efficiency and performance requirements of the new engine.
  - Adhere to VSB6 Modification Code A2 if additional or substitute air cleaners are fitted to cater for additional airflow from the turbocharger.
  - Ensure good engineering practice is adhered to at all times.
- Added the following installation requirements:
  - Ensure the new engine meets inlet depression and exhaust back pressure requirements of that engine's applicable ADR approval. Back pressure should be measured within 150 mm of the turbo outlet and in line with the neutral axis of the upstream bend.
  - Ensure turbocharger housing is not subject to excessive weight from downstream components of the exhaust system.
  - Adhere to VSB6 Modification Code A4 if an exhaust system or manifold is substituted to allow for fitting of the turbocharger.
  - If replacement injectors have been fitted and the fuel pump is adjusted to cater for additional airflow, ensure that the vehicle complies with ADR 30/.., 70/.. and 80/.. as applicable.
- Added to installation requirements the following recommendations:
  - When choosing the intercooler to be installed, give attention to the added restriction of air flow through the radiator and the potential for reduced engine cooling system capability.
  - Consider the effect of intercooler expansion on mountings.
  - Consider the need to fit additional or re-route existing oil lines to cool the turbocharger.
  - Secure and clear all oil lines of the exhaust and turbocharger systems.

- Moved requirement for heat shield and appropriate bracing from checklist into body of document as a recommendation.

A4-Exhaust system alterations

- Clarified that the exhaust design criteria are the manufacturer's design criteria.
- Added a requirement to ensure that systems required to meet ADR emission levels, such as selective catalytic reduction (SCR), exhaust gas recirculation (EGR) or diesel particulate filter (DPF), are installed in accordance with the engine manufacturer's guidelines.
- Expanded Exhaust system design requirements with the inclusion of requirements aligning with fuel system modifications with the addition of the following requirements:
  - Ensure that the exhaust components remain clear of any fuel lines and fuel system components so as not to pose a fire hazard.
  - When positioning the exhaust, ensure it is not placed in a location where overflow from a fuel filling operation may allow spilling onto any part of the exhaust.
  - Ensure fuel lines are secure and clear of the exhaust system at all times and provide adequate protection from excessive heat for all hoses, electrical harnesses, rubber or plastic components.
- Requirement for thermal expansion throughout the system to be taken into consideration has been made into a recommendation.
- Clarified the requirement to test the exhaust back pressure by specifying that the back pressure is to be tested in accordance with the manufacturer's requirements.
- Requirement for turbocharger housings to not be subject to excessive weight from downstream components has been made a recommendation.

A5-Road speed limiter installation

- Removed references to VSB2.
- Changed recommendation that the road speed limiter be installed in accordance with the manufacturer's recommendation to a requirement.
- Added requirements duplicated from VSB2:
  - Ensure the maximum road speed capability is not able to be increased or removed temporarily.
  - Ensure that if the road speed governor is not installed as part of an integrated system:
    - it is operated independently of the vehicle's braking system; and
    - all components needed to fulfil its function are energised whenever the vehicle is in operation.
- Clarified that is it is a requirement to test speed limiters or otherwise provide satisfactory evidence that the vehicle complies.
- Added additional method of demonstrating compliance with speed limiter compliance by accepting written evidence from the vehicle manufacturer (not a dealer).
- Clarified requirement for verifying maximum engine RPM by changed requirement to be tested under load to when in gear.

Section B - Transmission

B-Overview

- Extended scope to specifically mention power take offs (PTOs)

B1-Transmission substitution or additional fitting

- Extended scope to specifically mention power take offs (PTOs).
- Clarified by adding requirement that all supporting modifications must be performed and certified in accordance with relevant VSB6 modification code (i.e. where a body modification is required to allow an alternate transmission to be fitted, this modification must be performed and certified in accordance with VSB6 Section K).
- Requirement for tail shaft alterations to be performed in accordance with manufacturer's recommendations or in accordance with recognized engineering standards from Modification Code B1 checklist to reflect this.
- Added requirement to ensure that where any transmission modifications are performed, including the fitting of any auxiliary transmission or where an engine retarder or auxiliary/endurance brake is fitted, the effects on the tail shafts and transmission are considered.
- Added requirement to ensure all transmission modifications include an assessment of the tail shaft, even when no modification to the tail shaft is made.
- Added requirement to ensure when additional gears which are isolated by the vehicle manufacturer are enabled the following is done:
  - Where the vehicle is available from the vehicle manufacturer with the additional gears enabled or the option is covered by the vehicle manufacturer's identification plate approval, the modification is performed in accordance with the manufacturer's guidelines.
  - Where the vehicle is not available from the manufacturer with the additional gears enabled or they are not covered by the identification plate approval, perform the modification in accordance with this modification code.
- Extended requirement that vehicle gradeability and startability meet the requirements from Modification Code S3, to:
  The lesser of "S3, S8 or S9 as applicable", or the "manufacturer's specified gradeability/startability requirements".
- Added requirement that tyres fitted to a vehicle have appropriate speed rating.
- Added requirement to ensure that the vehicle's speedometer, odometer and road speed limiter accuracy have been maintained when changes to the transmission are performed.
- Ensure the vehicle's road speed limiter accuracy is maintained and, where required, verified in accordance with VSB6 Modification Code A5.
- Added requirement to use automotive type transmission mounts and suitably fabricated brackets to install all transmissions.
- Extended requirement to seal any cabin openings for gearshift control to prevent the entry of exhaust gasses to include road fumes.
- Added requirement that all transmission controls are able to be operated safely from the driving position.
- Added requirement that reversing lights, if fitted, operate when the reverse gear position is selected.
- Added requirement to Ensure that where a vehicle is fitted with an advanced safety system, such as anti-lock braking (ABS) or electronic braking systems (EBS), the transmission control unit (TCU) interfaces with the necessary safety systems (where applicable).

- Added requirement for automatic transmissions to comply with ADR 42/.. or relevant in-service vehicle standards regulations, as applicable.
- The following requirements were removed from the checklist and included as recommendations within the body of the modification code:
  - Neutral position to be located between the reverse and forward positions.
  - Park position to be located adjacent to the reverse positions.
  - Reverse selection movement to be upward, forward or to the left side.
- The following requirements were moved from the checklist to within the body of the modification code:
  - Starter be inoperative when the transmission control lever mechanism is in the forward or reverse position.
  - Confirm all controls are able to be operated safely from the driving position from Modification Code B1 checklist.
  - Transmission control lever position to be permanently displayed and illuminated within the driver compartment of the vehicle from Modification Code B1 checklist.
- Added requirement for the quality of work to be carried out to a satisfactory industry standard in Modification Code B1 checklist.
- Added requirement that the modified vehicle continue to comply with all affected Australian Design Rules in Modification Code B1 checklist.
- Added explicit requirement that the modification meet all the requirements of Modification Code B1 in Modification Code B1 checklist.
- Added the following requirements for Power take offs (PTOs):
  - Ensure where a PTO is installed it is installed in accordance with the PTO, vehicle, engine, transmission and tail shaft manufacturer's guidelines.
  - Ensure that where supporting modifications are performed as part of the installation of the PTO that they are performed and certified in accordance with the relevant sections of VSB6.
- Added the following recommendations for Power take offs (PTOs):
  - Ensure where a PTO can be controlled other than from the driver's normal seating position (remote control), including control of the vehicle's throttle, that the remote control is rendered inoperative unless:
    - the vehicle's transmission is in neutral; and
    - the park brake is engaged.
- Added a note that where the PTO interfaces with the engine, transmission or park brake system, ensure these modifications are performed in accordance with manufacturer's guidelines as well as the relevant sections of VSB6.

Section C – Tail shaft

C-Overview

- No technical changes

C1-Tail Shaft Alterations

- Added note that Tail shaft manufacturers and distributors may have specialised programs to assist in the design of tail shaft alterations and layouts.
- Removed advice on light vehicle tail shaft operational angles.
- Added requirement to ensure the effect of any horizontal offsets of engine / transmission / centre bearing(s) / rear axle input is assessed.
- Extended requirement to consider the maximum torque when designing a tail shaft, with the inclusion of a note that maximum torque may occur when an auxiliary/endurance brake is used.
- Moved the following recommendation to requirements:
  - Install universal joints so they are appropriately phased throughout the driveline to prevent vibration. This is typically in phase, however in some complex driveline systems use out-of-phasing to eliminate vibration.
- Added requirement to consider additional driveline components such as drop boxes auxiliary transmissions and auxiliary/endurance brakes, when performing driveline, driveshaft and angle calculations.
- Added requirement that with the exception of modifications being performed to manufacturer's specifications, that all modifications are have calculations performed and record for each time a tail shaft is altered.
- Clarified that horizontal offset is not shown in the example calculations, but that they should be considered.

Section D – Rear axle

D-Overview

- No technical changes

D1-Rear Axle Installation

- Extended requirement that the replacement axles have mass ratings, and gear ratio that are suitable for the vehicle to include a requirement that the torque ratings also be applicable.
- Extended requirement that if modification affects the road speed limiter that it is certified in accordance with VSB6 modification code A5.
- Clarified by adding requirement that all supporting modifications must be performed and certified in accordance with relevant VSB6 modification codes.

D2-Differential Substitution

- No technical changes.

Section E – Front axle, steering, wheels and tyres

E-Overview

- Added ADR 84/.. to the list of ADRs relevant to Section E.

E1-Front Axle Installation

- Added specific statement to the not covered section to clarify that the fitting of alternative rims and tyres to the rear axles is not covered by VSB6.
- Added ADR 84/.. to list of related standards.
- Added to following requirements to Compliance requirements:
  - Ensure the vehicle complies with all dimension requirements of both the ADRs and relevant in-service heavy vehicle regulations, including vehicle width and turning circle.
  - Ensure that ride height changes to the vehicle due to suspension/axle changes do not result in the height of

the front underrun protection (FUP) being outside of the manufacturer's specifications or ADR84/.. requirements.

- Added recommendation to take into consideration that changes to the front axle, wheels or tyres is likely to induce increased bump steer and that these modifications should be avoided wherever possible.
- Added the following requirements for welding axles:
  - Ensure any welding on a drive axle is performed inboard of the spring mounts and by a qualified welder in accordance with the axle manufacturer's welding instructions.
  - Perform all modifications in accordance with good engineering practice.

E2-Steering Alteration

- Added to following requirements to Compliance requirements:
  - Ensure the vehicle complies with all dimension requirements of both the ADRs and relevant in-service heavy vehicle regulations, including vehicle width and turning circle.
  - Ensure that ride height changes to the vehicle due to suspension/axle changes do not result in the height of the front underrun protection (FUP) being outside of the manufacturer's specifications or ADR84/.. requirements.
- Removed requirement for power servo valve to be integral with the steering box or power cylinder in a power steering system.
- Added requirement that the system pressure relief valve be integral with the steering box or power cylinder in a power steering system.
- Expanded requirement for the mounting of a power cylinder to not be damaged or be subject to excessive deflection to all power steering components.
- Expanded Installation requirements section covering the modification of pitman arms to include "other forged steel components".
- Moved the following recommendations to requirements:
  - all heating or welding of steering components be performed only by a qualified welder in strict accord with the component manufacturer's instructions.
- Added requirement that all steering column and pedal mounting brackets are original right hand drive components, duplicated from original components or of adequate strength and performance.
- Added requirement that all components provided for a left to right hand drive conversion enable the driver to safely operate the vehicle, such as instruments, rear vision mirrors, windscreen wipers and washers, are relocated or adjusted. The location, visibility and performance must comply with the relevant ADR, heavy vehicle standards regulation or be configured in such a way that mirrors the manufacturers left hand configuration.
- Extended requirement that the service brake failure visual indicator is visible from any new driving position with the option to add an additional indicator if the original does not suit both positions.

E3-Fitting of non-standard front wheel components

- Added specific statement to the not covered section to clarify that the fitting of alternative rims and tyres to the rear axles is not covered by VSB6.
- Added requirement to ensure that ride height changes to the vehicle due to fitting non-standard front wheels do not result in the height of the front underrun protection (FUP) being outside of the manufacturer's specifications or ADR84/.. requirements.
- Changed requirement for tyres to only be fitted to approved wheels by:
  - keeping reference to as approved by the Tyre and Rim Association of Australia.
  - removing reference to as approved by the tyre manufacturer and in accordance with the relevant ADRs.
  - added alternative to comply with ADR 42/.. .
- Added requirement that where a wheel or tyre is to be installed is not covered by the Tyre and Rim Association of Australia or the standards permitted by ADR 42/.. that they must be approved by the relevant heavy vehicle regulator.

Section F - Suspension

F-Overview

- Added ADR 84/.. to the list of ADRs relevant to Section F.

F1-Suspension Substitution

- Added clarification that where supplementary suspension is added to an existing system, consider it to be a substituted suspension.
- Moved the following recommendations to requirements:
  - Chassis strength is in accordance with Section H.
- Added a requirement to ensure that ride height changes to the vehicle due to suspension/axle changes do not result in the height of the front underrun protection (FUP) being non-compliant with ADR 84/.. or outside of the manufacturer's specifications.
- Added recommendation that where manufacturer's recommendations for bolt torque is not available, that the bolts are tightened to the torque specified in the relevant Australian Standard.

F2-Trailer Suspension Modifications

- Removed chassis modification requirements duplicated from Section H.
- Added requirement that chassis strength is in accordance with Section H.
- Added requirement that any chassis alterations including the installation of additional cross-members are made in accordance with Section H.
- Moved the following recommendations to requirements:
  - Shock absorbers must not fully extend or fully bottom in normal suspension operation.
- Added requirements for sliding axle assemblies.
- Added recommendations for sliding axle assemblies.
- Added recommendation that where manufacturer's recommendations for bolt torque is not available, that the bolts are tightened to the torque specified in the relevant Australian Standard.
- Extended welding and cutting requirement to take care to protect certain items by the specific inclusion of brake and electrical system hoses and conduits.
- Added recommendation that any welds be ground flush with the chassis rail, but to take care not to grind back the weld and chassis rail material excessively.
- Added recommendation to carry out grinding so that marks are along the frame rail.

Section G - Brakes

G-Overview

- Extended name of G5 to specifically cover endurance brakes.
- Re-named G8 to clarify that it is the certification of the design for the trailer brake system upgrade - Trailer brake system upgrade (design).
- Re-names the Checklists and Modification reports to better capture the use:
  - G Modification report – Air system re-charge data sheet
  - G4 Modification report – Brake system: ADR certified vehicle
  - G4 Modification report – Brake system: Pre-ADR vehicle.
  - G5 Checklist – Fitting of auxiliary and endurance brakes
  - G7 Checklist - Brake system substitution / wheelbase extension
  - G8 Checklist - Trailer brake system upgrade (design)
- Requirement added to give consideration is to the potential impact that suspension may have on the vehicles braking system.
- Expanded list of modifications that may affect the brakes and therefore require certification under Section G by the inclusion of:
  - fitting of wheels that have smaller ventilation holes than those specified by the truck OEM.
  - fitting of wheels or tyres that have a larger diameter than the maximum diameter specified by the truck OEM.
  - changing ADR category, for example, a truck that is changed to bus.
  - change of differential ratio (for vehicles fitted with transmission or driveline park brake) with a lower numerical number than that specified by the truck OEM.
- Expanded description in Vehicle Types – Type 3 to include advice on where vehicles are re-rated under Section S and the vehicle changes ADR category which inter requires certification of the brakes at the new category.
- Added Specific requirement for all supporting modifications to are performed and certified in accordance with the relevant modification codes.
- Expanded advice on advance braking systems from exclusively covering Electronic Stability control and included the following requirements:
  - Advanced braking systems and their components may be easily damaged by common modification, maintenance and servicing techniques, such as the use of rattle guns within one metre of the sensors. When undertaking any work on a vehicle fitted with an advanced braking system, ensure all modifiers are familiar with these systems and the precautions that must be taken.
  - Ensure that before undertaking any modification on a vehicle that is fitted with an advanced braking system, the modifier and AVE consult with the vehicle manufacturer to determine the impact on the system.
  - Where an advanced braking system is fitted to a vehicle, ensure that the manufacturer's advice has been provided indicating that the vehicle is suitable for installation of the system. The modification, subject to the above advice, can be certified under the applicable brake upgrade code (see VSB6 modification codes G4 or G8).
  - Modification approval is required from the relevant heavy vehicle regulator for the installation of advanced braking systems where they were not originally offered by the manufacturer and it is not otherwise covered by VSB6 Section G.
  - All modifications to vehicles fitted with advanced braking systems must be performed in consultation with the manufacturer as well as an AVE.
- Added recommendation to design requirements to ensure automatic slack adjusters are fitted to vehicles wherever an advanced braking system is added or modified.
- Added the following requirements for Vehicles fitted with an anti-lock braking system:
  - Only retrofit vehicles with anti-lock braking systems (ABS) that are appropriately programmed and certified by the vehicle or braking system manufacturer.
  - When adding an axle which requires wheel speed sensors, ensure the ABS tone/sensor wheel has the same characteristics as the other axles on the vehicle, including the number of teeth.
  - Ensure OEM recommendations are followed when upgrading an axle to ABS configuration.
- Added the following requirements for ABS requirements:
  - Ensure where ABS is retrofitted to a vehicle, the ABS complies with the version of ADR 35/.. or ADR 38/.. as applicable at the time the vehicle modification is certified, including but not limited to:
    - system (axle) configuration (as applicable)
    - minimum number of sensed axles
    - warning Lamps
    - wiring and electrical requirements.
  - Ensure the braking system meets all other relevant requirements of ADR 35/.. and ADR 38/.. as applicable at the date of manufacture with and without the anti-lock system operational.
  - Ensure where a B-double rated prime mover has ABS retrofitted, or the ABS is modified, that the vehicle is fitted with ABS as required in ADR 64/.. .
  - Ensure slack adjusters are of an automatic type, including where ABS is retrofitted to a vehicle.
- Moved the following requirements of Pipes, hoses and wiring requirements to recommendations:
  - Maintain original air circuit connections wherever possible and avoid creating excessive additional joints.
- Added requirement for Air brake systems to:
  - Ensure that consideration is given to the potential impact that suspension may have on the vehicle's braking system.
- Added specific note to Air brake systems:
  - It is highly recommended that all brake chambers on an axle be of the same make, model and size.
- Extended the requirements for compressor re-charge time of Pre-ADR 35/.. and ADR 38/.. vehicles to allow for compliance with ADR 35/.. .
- Added definitions for Pre-ADR 35/.. and ADR 38/.. vehicles:
  - Average operating pressure (refer to ADR definitions) is normally nominated by the vehicle manufacturer. Alternatively, it may be regarded as the average of the compressor cut-in and cut-out pressures for the purpose of this test.
  - The 'required stored energy capacity' is the minimum air capacity as defined in the first dot point above.

- Added recommendations for Pre-ADR 35/.. and ADR 38/.. vehicles:
  - For vehicles equipped to tow a trailer over 3500 kg, ensure that the vehicle can comply with the recharge requirements with the 'required stored energy capacity' increased with:
    - an additional 1.0 litres per tonne of rated towing capacity (the difference between the gross combination mass [GCM] and the GVM); or
    - where the GCM exceeds 65 tonnes, use the value of 65 tonnes for the GCM to establish the additional reservoir capacity needed.
- Added note for Vacuum brake system requirements:
  - It is highly recommended that all brake chambers on an axle be of the same make, model and size.
- Clarified the recharge requirements for Pre-ADR vehicles using vacuum brake systems.
- Added specific requirement that the park brake control is designed to minimise the possibility of inadvertent release of the brakes.
- Added requirement that any modification that changes how the park brake system is applied is designed to be separate from the service brake control and incorporate a device to retain the park brake in the applied position.

G1- Air brake system relocation of air brake components

- Removed guidance on how the length of a brake system is measured.
- Added requirement that where brake lines are lengthened that the maximum transmission length is as per the brake system certification, and where this is not known, that the brake system is required to continue to meet the application and release times of ADR 35/.. and ADR 38/.. as applicable.

G2-Installation of trailer braking controls-Air brakes

- Extended modification code to cover vehicles built Pre-ADR.
- Added requirement that where a vehicle is equipped to tow a trailer with an ATM of more than 4.5 tonnes and it is fitted with an electrical connection for the ABS ensure it complies with ADR 35/.. .
- Added requirement to make the ABS power plug with the voltage and provide a warning label in the cabin to warn the driver.
- Removed the requirement for the tractor protection valve to be located within the cabin.
- Changed requirement for tractor protected air supply cut off to 450kPa to align with ADR requirements.
- Added requirement that he trailer service signal output supplied by the motor vehicle is within the levels required by ADR 35/01 (or later) for the motor vehicle service brake performance (established retardation coefficient).
- Added requirement to test the trailer signal response time in accordance with VSB6 Modification Code G8.
- Added the following requirements for in-cab manual ratio valves:
  - If an in-cab manual ratio valve is fitted, ensure that the service signal output with relation to the vehicle's brake performance remains within the output level requirements of ADR 35/01 (or later) with the manual hand control valve in all positions.
- Added the following note for in-cab ratio valves:
  - In order for the brake system to achieve adequate response times, some systems require devices with additional check valved storage reservoir of tractor protected air between the tractor protection valve and any ratio/relay valve.
- Added recommendations for pre-ADR 35/01 vehicles covering Air brakes compressor:
  - Ensure that the vehicle can comply with the Air brake system re-charge requirements in Section G – Overview with the 'required stored energy capacity' increased with:
    - an additional 1.0 litre per tonne of rated towing capacity (the difference between the GCM and the GVM); or
    - where the GCM exceeds 65 tonnes, use the value of 65 tonnes for the GCM to establish the additional reservoir capacity needed.
- The trailer parking brake control requirements for where a truck complying with ADR35/.. via UNECE R13 have been clarified by requiring trucks that directly complying with ADR 35/.. to apply the trailer park brakes when the towing vehicles park brake apply and recommending that those trucks which comply via UNECE R13 to apply the park brake system of the trailer when the towing vehicles park brakes are applied.
- Added the following requirements for trailer electrical connections:
  - Ensure the vehicle is fitted with an electrical connector to supply electricity to the trailer lights in accordance with the requirements of ADR 42/00 or later.
  - If a vehicle is fitted with ABS, fit an electrical connection for the ABS of any towed trailers meeting the ABS electrical connection requirements of ADR 35/01 or later.
  - If a vehicle is fitted with an electrical connection for the ABS of any towed trailers, ensure the vehicle is fitted with a warning light. The warning light must meet the criteria listed as required in the ABS Requirements section in Section G — Overview.
- Added the following recommendations for trailer electrical connections:
  - If a motor vehicle is not fitted with ABS, fit an electrical connection for the ABS of any towed trailers that meets the ABS electrical connection requirements of ADR 35/01 or later.
  - Ensure the park/clearance circuit is protected by fuse or circuit breaker for the trailer supply.

G3-Trailer brake system upgrade

- Added specific requirement that any supporting modifications are performed and certified in accordance with the relevant modification codes.
- Added requirement to ensure that the transmission length is no more than the maximum of the trailer on which the brake system is modelled, or where the control system is certified with a SARN, no more than the approved maximum designed transmission length.
- Changed the requirements of the trailers brake system being used for comparison from being similar to being identical.
- Extended methods of demonstrating compliance to ADR 38/.. by the specific reference of a trailer design certified by VSB6 Modification Code G8.
- Removed specific requirement that the trailer be re-rated and that the re-rating be done in accordance with VSB6 Modification Code S7.
- Added requirement to compliance requirements:
  - Where the braking system performance has been altered, verify the ATM/GTM in accordance with the requirements of VSB6 modification codes S7 and S12 where applicable.

- Added note covering Increase in ATM/GTM when fitting brake system:
  - Upgrading of a trailer's brakes is only one possible change that may be required to increase the ATM/GTM. Assessment and certification of the trailer under the S7 and S12 modification codes (as applicable) is also required.
  - Evidence from the G3 certifying AVE may be required by the S7/S12 AVE to ensure the appropriateness of the braking system.

G4-Brake System Certification

- Restricted modification code to motor vehicles only (no longer applicable to trailers).
- Expanded scope to specifically cover the addition of load sensing proportioning valves.
- Expanded areas methods of validating compliance by permitting Full ADR 35/.. testing.
- Added limitation that a vehicle used as a comparison must have a GVM not higher than 20% more that the GVM to be used.
- Clarified the requirements for demonstrating compliance where a vehicle has had the wheelbase shortened to less than that offered by the manufacturer.
- Added requirement to determine if the foundation brakes are compatible with the axle load carrying capacity for the modified vehicle.
- Changed the requirements of the vehicle brake system being used for comparison from being similar to being identical.
- Added the requirements that load sensing proportioning valves must be installed in accordance with manufacturer's recommendations.
- Added marking requirements for vehicles that have load sending proportioning valves retrofit.
- Added requirement to supply instructions to the vehicle operator illustrating how to correctly set or adjust the load sending proportioning valves for use during service.
- Added requirement for the installation of load sending proportioning valves to be done in accordance with modification G4.
- Changed the requirement for pre-ADR vehicles to be updated to ADR requirements to a strong recommendation.
- Added requirements for where alternative axles are fitted and the Gross Vehicle Mass is reduced:
  - The braking system on the axles is compatible with the decreased GVM.
  - The axle load distribution is correct at the decreased GVM.
- Additional requirement that where alternative axles are fitted that it is performed in accordance with the appropriate sections of VSB6.
- Expanded the requirement for where slack adjusters are fitted to the drive axle group that they are also fit to additional or replacement drive axles, to include all axles.
- Changed the requirement when modifying the brakes on a hydraulic system from specifically requiring an additional master cylinder to one of a number of options.
- Removed recommendation to increase the combined contact area of the brake friction materials of the modified vehicle in proportion to the proposed GVM to the original GVM.
- Changed the following recommendation to a requirement of removal of an axle requirements:
  - If a load sensing valve or other controlling device is normally fitted for the proposed axle/wheelbase configuration, install the valve correctly and adjust it in the modified vehicle.

G5-Fitting of auxiliary brakes engine, exhaust or retarder type

- Removed specific requirement for vehicles which were not offered by the manufacturer with an auxiliary brake from the manufacturer to confirm compliance with noise emission ADRs.
- Added requirements to Compliance requirements:
  - Ensure that installation of an auxiliary and endurance brake does not cause exhaust back pressure to exceed the vehicle manufacturer's specifications (see VSB6 Modification Code A4).
  - For auxiliary/endurance brakes that act on drivelines or transmissions see VSB6 Section B — Transmissions or Section C — Tail shafts as applicable.
- Changed the following requirement to a recommendation:
  - When installing an auxiliary/endurance brake that utilises the engine cooling system, supply the vehicle a radiator with sufficient capacity to reject the additional heat generated by the auxiliary/endurance brake.

G6-Fitting of air operated accessories

- Amended the scope to cover:
  - installation of a pressure protection valve for the use with air operated accessories.
  - installation of an additional method of brake application.
- Added requirement to ensure that the compressor is of suitable capacity and duty cycle for the air draw of any air operated accessories.
- Amended the requirement for pressure protection of the brake system to align with the cut-off pressure required in the ADR.
- Added the following compliance requirement that applies to additional methods of brake application:
  - Where any additional method of brake application is installed to a vehicle, ensure the application and release methods meet the requirements of ADR 35/.. and ADR 38/.. as applicable.
- Added requirement that where air tanks are added to power the air operated accessories or after the pressure protection valve that the vehicle continue to meet the re-charge requirements for ADR 35/.. .
- Changed the following requirement to a recommendation:
  - If a vehicle is fitted with a supply (wet) reservoir that provides air to separate braking system reservoirs, then source air for ancillary devices only from the supply (wet) reservoir.
- Added the following requirements as design requirements for Additional methods of brake application:
  - Ensure where connected to the park brake system the release is designed to minimise the possibility of inadvertent release of the brake.
  - Ensure where connected to the service brake system the application method applies the brakes to all of the road wheels.
  - Ensure where separate methods of actuation of the brake system are provided for any of the systems (i.e. service/park), the actuation of one system does not cause the operation of any other system.
  - Ensure an additional method of brake application:
    - is not capable of engaging when the vehicle is travelling in excess of 10 km/h.

        - is fitted with an in-cab audible and visual warning to alert the driver when the system is activated.
    - Ensure any additional methods of brake application or release are within the reach of the driver in their normal seated position.
- Added the following recommendations as design requirements for Additional methods of brake application:
    - Ensure that any additional method of brake application only acts on the park brake system.

G7-Brake system substitution or wheelbase extension powered vehicles

- Added requirements to Compliance requirements:
    - Additional requirement that where alternative axles are fitted that it is performed in accordance with the appropriate sections of VSB6.
- Added recommendation to Compliance requirements:
    - Organise proof of equivalent performance from dynamometer test data, even if with identical lining material and similar actuation the brake group is of an alternative manufacturer which may not be equivalent to the original equipment brakes, due to different shoe factors and efficiencies.
- Changed the requirement when modifying the brakes on a hydraulic system from specifically requiring an additional master cylinder to one of a number of options.

G8-Trailer brake system upgrade (Design)

- Removed the upgrading brake system of a trailer modified to a specification that differs from manufacturer's standard from the scope (this is covered by Modification Code G3).
- Additional requirement that where alternative axles or suspension is fitted that it is performed in accordance with the appropriate sections of VSB6.
- Added recommendation that a G8 approved AVE may issue a G8 modification certificate and checklist, for use by a G3 approved AVE to inspect and fit a modification plate to a modified trailer.
- Clarified that if a G8 AVE is issuing a checklist of a G3 AVE that a design certificate must also be issued.
- Added clarification that calculations in accordance with ADR 38/.. may be used validate compliance.
- Added the requirements that load sensing proportioning valves must be installed in accordance with manufacturer's recommendations.
- Added marking requirements for vehicles that have load sending proportioning valves retrofit.
- Added requirement to supply instructions to the vehicle operator illustrating how to correctly set or adjust the load sending proportioning valves for use during service.
- Added requirement for the installation of load sending proportioning valves to be done in accordance with modification G4.

Section H - Chassis

H-Overview

- Clarified scope of H5 by elaborating on items that are covered.
- Changed the scope of H6 to cover the installation of an approved front underrun protection (FUP) device or FUP system.
- Created new H7 code to cover the certification of a FUP device or FUP system not approved to ADR 84/.. or under ADR 84/.. to an alternative standard.
- Added list of ADRs which may be relevant to modifications perfumed under Section H.
- Added the following requirements in Design requirements:
    - Where chassis alterations result in modifications to the wiring harness, ensure, where possible, replacement harnesses are installed to avoid cutting/splicing. Seek guidance from the vehicle manufacturer about the preferred method for lengthening or shortening wires or cables.
- Changed following requirements to recommendations in Design requirements:
    - Fasten all attachments to the web of the chassis.
    - Ensure all modified chassis rails are straight and square before assembly.
    - Do not straighten bowed chassis rails by assembly of the frame (i.e. bolting everything together to straighten the chassis).
- Added section covering additional holes in the chassis.
- Changed following requirements to recommendations in Design requirements for Bolts and fasteners:
    - Do not use spring type washers on structural members.
- Added the following recommendations to design requirements for chassis reinforcing:
    - Reinforce chassis joins that are not in low stress areas to ensure adequate chassis strength.
    - Taper the ends of any reinforcing section to reduce abrupt change in chassis stiffness as a result of reinforcement installation.
- Changed following recommendations to requirements in Installation requirements for cutting of chassis rails:
    - Consider, in particular, these two situations
        - Load distribution on chassis is unchanged or improved.
        - Wheelbase is increased by lengthening chassis between wheels or adding an axle behind the rear axle.
- Changed following recommendations to requirements in Installation requirements for welding of chassis:
    - Before performing any welding on a vehicle chassis, obtain the material specifications of the chassis so that the correct welding consumables and welding procedure are used.
    - Follow the vehicle manufacturer's recommendations for welding and preparation (i.e. pre-heating).
    - Always attach the earth welding cable terminal as closely as possible to the region in which welding is being carried out.
    - Never attach the earth terminal to components such as axles, springs, engine, driveline, etc. Arcing on these components may cause serious damage to bearings, springs, or other stressed components etc. and parabolic leaf springs are particularly sensitive to surface damage.
    - Ensure the electrode or the earth clamp does not come into contact with electrical component casings (e.g. ECU's).
    - Ensure the electrode or the earth clamp does not come into contact with electrical component casings (e.g. ECU's).
    - Before welding any part of the cab consult the manufacturer as some use a stressed shell to provide cab strength and integrity; welding can affect the strength of such cabs.

- Take care to protect suspension parabolic leaf springs, air suspension springs as well as brake and air and electrical system hoses, wires and conduits against:
  - cutting and welding sparks and spatter
  - temperatures exceeding 80 degrees Celsius.
- Remove fuel tanks and pipes from the vicinity of welding.
- Before welding, disconnect the alternator, batteries, regulator and, if fitted, electronic components for the anti-lock braking system (ABS) and engine management systems.
- Position surfaces to the correct gap prior to welding.

- Added the following recommendations in Installation requirements for Cross-members requirements:
  - Except when joining the chassis flange or fitting longitudinal strapping, do not place welds within 25 mm of flanges.
  - Use low-hydrogen consumables to weld suspension brackets.
  - In low ambient temperatures or if there is dew or other moisture present, slightly warm the area to be welded i.e. with an oxy-fuel torch.
  - Remove auxiliary air and oil tanks in the vicinity of welding.
- Changed following recommendations to requirements in Installation requirements for welding of chassis:
  - Do not weld within 40 mm of the edge of a cross-member gusset.
- Clarified that flame cut holes are prohibited.
- Changed following recommendations to requirements in Installation requirements for Drilling holes in chassis:
  - Do not elongate existing holes.
- Added the following requirements in Installation requirements for Drilling holes in chassis:
  - Ensure bolts have sufficient unthreaded under headed length to prevent thread being in contact with the inside of the hole.
  - Use a hardened washer between the chassis and the nut so that the nut has enough thread on the bolt to be fastened tightly.
  - Do not drill holes in chassis flanges unless:
    - the practice is recommended by the original equipment manufacturer; and
    - an attachment method of the original equipment manufacturer is being directly replicated.
- Added the following recommendations in Installation requirements for Drilling holes in chassis:
  - Ensure the shank of the filler bolt is a tight fit within the chassis hole and extends throughout the depth of the hole.
  - If the original equipment manufacturer permits, plug weld existing holes in non-heat treated chassis rails to prepare for re-drilling of new holes in close proximity to pre-existing ones.
  - Plug weld holes in line with the 'Welding of chassis' requirements in this section of VSB6.
- Added examples of positioning hole centres in installation requirements for drilling holes in chassis.
- Added example calculation of weight distribution.

H1-Wheelbase extension outside OEM options

- Clarified the scope of permissible modifications by specifically noting that the following is not covered:
  - replacement of original chassis with one of longer length where the modification is not permitted by the manufacturer's modification requirements.
- Added the following requirements in Compliance requirements:
  - Ensure the brake response timing meets the requirements set out in VSB6 Section G — Brakes.
- Added the following requirements in Design requirements:
  - Ensure brake system alterations are performed and certified in accordance with VSB6 Section G — Brakes.
  - Ensure where steering alterations are required, including changes to steering arms/linkages, to maintain acceptable turning circle these alterations are performed and certified in accordance with VSB6 Section E — Front axle steering wheels and tyres.
- Changed following recommendations to requirements in Design requirements:
  - Ensure tail shaft alterations are performed and certified in accordance with VSB6 Section C — Tail shafts.
  - Do not allow extended chassis rails to exceed overall length or rear overhang dimensional limits as outlined in the ADR 43/.. or the relevant in-service heavy vehicle regulations as applicable.
- Changed following recommendations to requirements in Installation requirements for Increasing wheelbase or chassis length:
  - If additional chassis rail length is required, achieve this by extending the rear overhang rather than inserting any extension between the front and rear axle groups.
  - If possible, achieve an increase in wheelbase by moving the complete rear axle assembly along the frame.
  - Only cut the chassis and insert extensions when relocation of the rear axle assembly is not feasible, e.g.:
    - if the rear overhang has a tapered chassis rail section.
    - if the vehicle manufacturer requires the chassis to be cut rather than the suspension group moved rearwards.
- Added the following requirements in Installation requirements for Joins:
  - Consult with the vehicle manufacturer on the location of the cut, where this information is not available:
    - for heat treated rails, use a cut angle of 45 degrees +/- 15 degrees if possible.
    - for cold rolled rails, perpendicular cuts may be used.

H2-Wheelbase reduction outside OEM options

- Clarified the scope of permissible modifications by specifically noting that the following is not covered:
  - replacement of original chassis with one of shorter length where the modification is not permitted by the manufacturer's modification requirements.
- Added the following recommendations in Design requirements:
  - If the driveline of the vehicle is altered in any way as a result of the chassis being shortened, undertake a review of the driveline using VSB6 Section C — Tail shafts.

H3-Wheelbase alterations within OEM options

- Clarified the scope of permissible modifications by specifically noting that the following is not covered:

- replacement of original chassis with a chassis of longer or shorter length where the modification is not permitted by the manufacturer's modification requirements.

H4-Chassis Alteration

- Clarified the scope of permissible modifications by specifically noting the types of chassis alterations covered:
  - chassis alteration required to support other modifications such as repair, reinforcing or changes required to the chassis for the modification of suspension etc.
- Added the following note to Design requirements for Chassis repair – eliminating causes of chassis failure:
  - Vehicle manufacturers publish repair guidelines that detail approved repair methods as well as practices that are prohibited. These repair guidelines should be considered before undertaking any repairs to a vehicle's chassis.
- Changed following recommendations to requirements in Design requirements for Chassis repair – Eliminating causes of chassis failure – Behind the rearmost front spring hanger bracket:
  - When repairing a crack in this area after the cause is eliminated, drill the end of the crack to prevent it from travelling further and then re-weld the crack in accordance with Section H - Overview.
  - Do not terminate chassis rail reinforcement within this area.
  - Fit an additional reinforcement that extends forward of the rearmost front spring hanger bracket by a distance equal to twice the chassis rail height (2H).
  - Accommodate the engine and cab mounting brackets and extend rearward past the start of the body sub-frame by at least 3H. Install the reinforcement in accordance with Section H - Overview.
- Changed following requirements to recommendations in Design requirements for Chassis repair – Eliminating causes of chassis failure – Cross-member gussets:
  - Do not repair gussets, instead replace gussets with new gussets of the same style.
- Changed following requirements to recommendations in Design requirements for Chassis repair – Chassis rail straightening:
  - Before straightening a bent chassis rail, remove all chassis components in the area of damage and examine for cracks and damage.
  - Ensure a straightened chassis rail is straight and square over its entire length and does not show evidence of buckling, indentation, cracking or elongation of holes.
- Changed following recommendations to requirements in Design requirements for Suspension changes:
  - Consult VSB6 Section F — Suspension when fitting an alternative suspension to the chassis.
- Changed following requirements to recommendations in Design requirements for Suspension changes:
  - Ensure that the suspension manufacturer's controls for the suspension, braking and ride height control systems work with the vehicle manufacturer's systems.

H5-Trailer Chassis Modification

- Clarified the scope of permissible modifications by specifically noting the types of chassis alterations covered:
  - trailer chassis extension or reduction, including dimension between point of articulation and:
    - rear overhang line
    - rear end.
  - chassis alterations for the fitting of suspension substitutions (including relocation of suspension systems).
  - installation or removal of cross-members.
  - attachment of components to the chassis such as container twist locks.
- Clarified the scope of permissible modifications by specifically noting the types of trailer chassis alterations not covered:
  - trailer chassis modifications to change the trailer's basic type, e.g., semitrailer to dog trailer, pig trailer to dog trailer, semitrailer to dolly, etc. When a trailer type is altered, the trailer is regarded as being remanufactured rather than modified and as such, a new identification plate approval must be issued and a new VIN issued to identify correctly the trailer and the manufacturer.
- Added the following recommendations in Compliance requirements:
  - Take care when modifying a road tank vehicle and ensure that the vehicle continues to comply with all applicable requirements, including those of AS2809 *Road Tank Vehicles for Dangerous Goods* and the *Australian Dangerous Goods Code*.
- Added the following requirement in Design requirements for Chassis components – chassis sections and components:
  - Use the vehicle manufacturer's chassis material and components if available. Where this is not available, ensure all material used to modify chassis rails are of the same dimensions and material specification as the original chassis.
  - If the end of a chassis cross-member is used to mount a tow coupling, design and manufacture it to satisfy the requirements of ADR 62/..and ADR 63/.. as applicable. Tow members with a high D-value require substantial reinforcing and bracing.
- Changed following recommendations to requirements in Design requirements for Chassis components – chassis sections and components:
  - Ensure all chassis components are straight prior to assembly (with the exception of any camber designed into the main rails).
  - Use piping of the same bore as the original manufacturer when altering air or hydraulic lines and do not introduce additional restrictions at fittings.
  - Ensure any alteration of the electrical system is waterproof and electrically sound.
- Changed the requirement for smooth transition of sections on trailer chassis from "one in four" to "one in five".
- Extended requirement for rear end of frame cross members with the following requirement in Design requirements for Chassis components – Cross-members:
  - If the end of a chassis cross-member is used to mount a tow coupling, design and manufacture it to satisfy the requirements of ADR 62/..and ADR 63/.. as applicable. Tow members with a high D-value require substantial reinforcing and bracing.
- Changed following requirements to recommendations in Design requirements for Modifications impacted by or impacting on chassis design – Suspension modifications:
  - Ensure the chassis is given adequate cross-bracing at the suspension mounting positions.
  - Use material for the cross-bracing as determined by the design of the suspension brackets.

- Incorporate cross-bracing at least equivalent to the original vehicle manufacturer's recommendations into the chassis at the suspension mounting positions.
- If a non-optional suspension is fitted to the trailer, follow the suspension manufacturer's installation instructions and undertake a full analysis of the chassis/suspension package.

- Added the following requirements to Design requirements for Modifications impacted by or impacting on chassis design – Fitting or removing axles:
  - Where the ATM/GTM of the trailer requires changing, ensure this is certified in accordance by an appropriately accredited AVE in accordance with VSB6 modification codes S7 and S12 as applicable.
- Changed following requirements to recommendations in Design requirements for Modifications impacted by or impacting on chassis design – Fitting or removing axles:
  - If the modified chassis is outside the manufacturer's options, arrange for a professional engineer registered with a professional registration body to perform stress calculations to demonstrate that allowable limits are not exceeded.
- Extended requirement for the installation of fifth wheels, kingpins and other couplings to:
  - Ensure that the fitting of any fifth wheel, kingpin or other tow coupling satisfies the requirements of VSB6 Section P — Tow couplings, ADR 62/.. , ADR 63/.. and ADR 64/.. as applicable.
- Changed following recommendations to requirements in Installation requirements for Cutting of chassis rails:
  - Do not place any join in the chassis at a point of high stress, for example, at the neck or in the vicinity of suspension hanger brackets. Avoid the area and immediate vicinity where a cross-member meets the chassis rails. Position joins in the deeper section of the chassis rails.
  - Configure the join in the chassis rail in accordance with the original manufacturer's recommendations or, if unavailable, stagger the joins in the top flange, web and lower flanges.
  - If possible, make joins in the lower flange at 45 degrees and reinforce straight joins in the lower flange (see below 'chassis rail reinforcement').

H6-Install approved Front Underrun Protection

- Significantly revised to cover off the installation of FUP devices and FUP systems where :
  - it has been designed and certified with a component registration number (CRN) in accordance with ADR 84/.. ; or
  - it is otherwise approved under ADR 84/.. via an alternative standard; or
  - it has been designed and certified according to Modification Code H7 and is affixed with an approval plate as described in Modification Code H7.
- Scope of modifications covered:
  - installation of an approved FUP device or FUP system.
- Modifications specifically not covered:
  - design and manufacture of a FUP device or system (see VSB6 Modification Code H7).
  - fitting of a non-approved FUP device or system.
  - fitting of FUP compatible components (see Compatible components' segment of VSB6 Modification Code H7).
  - fitting of a FUP device or system covered by vehicle identification plate approval prior to supply to market including those fitted by an authorised representative of the OEM (i.e. at a dealership) before supply to market and where the device or system is included in identification plate approval certification.

H7-Design or manufacture aftermarket Front Underrun Protection

- Significantly revised to cover off the certification of FUP devices and FUP systems which are not other
  - certified with a component registration number (CRN) in accordance with ADR 84/.. ; or
  - otherwise approved under ADR 84/.. via an alternative standard.
- Scope of modifications covered:
  - certification of a FUP device or FUP system not approved to ADR 84/.. or is otherwise approved under ADR 84/.. via an alternative standard.
- Modifications specifically not covered:
  - installation of a FUP device or FUP system to a vehicle covered by the H6 code.
  - certification of a FUP device or system certified to ADR 84/.. or otherwise approved under ADR 84/.. via an alternative standard.
  - if the vehicle is fitted with a FUP device or system covered by the vehicle's identification plate, approval before supply to market (including by an authorised representative of the OEM, such as at a dealership).

Section J – Body mounting

J-Overview

- Added note that this section of VSB6 specifies the minimum design and performance requirements for the installation of a body onto a vehicle.
- Clarified the following:
  - the vehicle manufacturer's recommendations are to be the primary source for modifications.
  - Modification Code J1 also applies to:
    - mounting of bodies to all types to trailers.
    - the fitting of body equipment (e.g. roll-over tarps) not covered by other sections of VSB6.
  - Modification Code J2 applies to the fitting of a bus body (i.e. a passenger carrying pod) onto a truck cab-chassis, with accompanying change of gross vehicle mass (GVM) (Modification Code S1), seating capacity (Modification Code K1) and of ride height (Modification Code F1).
  - Modification Code J2 applies to the mounting of a complying bus body on a complying rolling chassis.
  - A bus body must be installed on a motor vehicle chassis in accordance with both Modification Code J1 **and** certified for bus related requirements in accordance with Modification Code J2.
  - All dimensions of a vehicle, including internal (where applicable) and external, are in accordance with the limits specified by the applicable in-service heavy vehicle regulator.
  - About ADR dimension limits:
    - Ensure all dimensions of a vehicle, including internal (where applicable) and external, are in accordance with the limits specified by the applicable in-service heavy vehicle regulator. When considering compliance with dimension limits, loading of the vehicle must be taken into account. For example, loading of a vehicle fitted with a tipper body may result in bulging of the sides that result in the vehicle exceeding width limits. To

prevent this, less flexible materials or structures that support the body may need to be used.
    - Some jurisdictions may allow these dimensions to be exceeded under certain circumstances or conditions through notices or permits. Consult your heavy vehicle regulator for advice.
    - The installation of a body or body equipment that exceeds the dimension limits is not to be certified under this Section of VSB6.
    - Where the relevant heavy vehicle regulator has issued a dimension exemption, modification may be certified in accordance with VSB6 Section J.
- Added Modification Code J3 (see below)

J1-Body Mounting

- Changed scope from prohibiting the installation of a complying omnibus body, to allowing the installation of an omnibus body onto a complying rolling chassis when done in conjunction with J2.
- Clarified the scope of permissible modifications by specifically noting the types of chassis alterations covered:
    - mounting of complying omnibus bodies on complying rolling chassis (in conjunction with Modification Code J2).
- Clarified the scope of permissible modifications by specifically noting the types of trailer chassis alterations not covered:
    - fitting of omnibus bodies that are not also certified using Modification Code J2.
    - mounting of bodies for specific vehicle category ADR compliance, e.g. bus roll-over protection.
    - fitting of any body intended for the carriage of people, except when certified to Modification Code J2.
    - mounting of fifth wheels/turntables (see VSB6 Section P — Tow couplings).
    - mounting of ROPS or FOPS to a motor vehicle (see VSB6 Modification Code J2).
    - installation of vehicle mounted lifting systems (see VSB6 Section R — Vehicle mounted lifting systems).
- Added note to scope that the mounting of a truck-bus body must be performed and certified in accordance with this code and also certified as a bus in accordance with VSB6 Modification Code J2.
- Added the following requirements to Compliance requirements:
    - Ensure all modifications are performed and certified in accordance with the relevant sections of VSB6.
- Extended the following requirement to ensure axle loads do not exceed the lesser of the manufacturer's prescribed axle capacities or jurisdictional legal load limits; with: unless exempted by the relevant heavy vehicle regulator.
- Changed the following recommendations to requirements in Design requirements:
    - Use the vehicle manufacturer's manual as the main source of information for modifying the vehicle body.
    - Apply a design factor of safety of three to body mounting components.
    - Endeavour to mount heavy parts of the body or equipment as low and symmetrically about the chassis as possible. This will assist in minimising the centre of gravity height.
    - Ensure the body attachment can withstand and evenly distribute forces imposed by payload and body weight during worst case conditions such as full braking and overturning moments.
- Removed the specific recommendation that in the absence of such guidelines mounting points must be designed to spread the load over a sufficient area of chassis to avoid point loading stress.
- Removed note that where rivets prevent mounting flush to the top flange a flat mild steel or compressed polyurethane (or other suitable material) spacer drilled to clear the rivets may be fitted.
- Added the following requirements to Design requirements:
    - Ensure protruding weld beads do not make contact with the top flange of the chassis when in operation. This includes components such as body sub-frames or the bottom side of caps welded to body longitudinals.
- Added the following recommendations to Design requirements:
    - Do not allow the body mounting attachment, including welding or bolts, to be closer than 50 mm to any spring hanger bolt or rivet.
    - Avoid using U-bolts for body/sub-frame attachments
    - Ensure the design and installation of the body does not negatively impact on vehicle functions access for maintenance purposes.
- Clarified that the 900mm spacing between body mounts includes but is not limited to outrigger mounts, fish plates and U-bolts.
- Added the following requirement to Installation requirements for U-bolt mounting:
    - Ensure the manufacturer guidelines are referred to as the use of U-bolts may not be endorsed, particularly for use in conjunction with heat treated chassis rails.
    - Use a minimum of three U-bolts per side of the chassis with a maximum pitch spacing of 1 .2 m.
- Removed the following requirement for Installation requirements for U-bolt mounting:
    - Use a minimum of three U-bolts per side of the chassis with a maximum pitch spacing of 1750 mm.
- Added the following examples of why the use of U-bolts should be avoided:
    - U-bolts holding body longitudinals are often over tightened causing:
        - reduced chassis strength
        - frame distortion.
- Changed the following recommendations to requirements in Installation requirements for of Body mount type requirements - Flexible bodies — platform bodies - Outrigger mounts:
    - Ensure bolts joining the frame brackets to the body bracket do not carry shear loads by using brackets designed to limit movement under acceleration and braking.
- Added the following requirements for Installation requirements of Body mount type requirements - Flexible bodies — platform bodies - Outrigger mounts:
    - Use bolts with a minimum ISO Grade 8.8 (or SAE Class 5) and appropriate grade nuts (see AS 1110.1). The use of vibration-proof fasteners of equivalent strength such as Huck bolts are an acceptable alternative.
    - If using alternative fasteners, check the bolt manufacturer's specifications to ensure that they are of equivalent strength and toughness.
- Clarified the following requirements in Installation requirements for Installation requirements of Body mount type requirements - Flexible bodies — platform bodies – Fish plate mounts:

- Attach fish plate mounts securely to the web of the chassis.
- Prevent flexing of the web by extending the bracket at least half-way down the web of the frame.
- Where attached using bolts, use bolts with a minimum ISO Grade 8.8 (or SAE Class 5) and appropriate grade nuts (see AS 1110.1). The use of vibration-proof fasteners of equivalent strength such as Huck bolts are an acceptable alternative.
- If using alternative fasteners, check the bolt manufacturer's specifications to ensure that they are of equivalent strength and toughness.

- Clarified the following recommendations in Installation requirements for Installation requirements of Body mount type requirements - Flexible bodies — platform bodies – Fish plate mounts:
  - To facilitate body fitting, enable one pair of mounts to have plain holes to provide fore and aft body location. The remaining mounts may have slotted holes.
  - Bolt mounts to the chassis at intervals of 900 mm (this may be altered to suit the installation).
  - Provide a clearance space between the frame and the body longitudinals and cross-members.
- Added the following requirements for Installation requirements of Body mount type requirements - Short rigid bodies — tipper bodies - Typical support bracket:
  - Tipper bodies that have a form of hoist and as such must meet AS1418.8 requirements, including:
    - Ensure all hydraulic hoist systems contain burst protection that will, in the event of hose rupture or pipe fracture, prevent the movement of loadbearing hydraulic cylinders.
    - Ensure tipper bodies fitted to motor vehicles and trailers comply with the relevant requirements of AS1418.8 including the 'tip truck hoisting systems' section.
- Added the following requirements for Installation requirements of Body mount type requirements - Short rigid bodies — tipper bodies - Body props:
  - Ensure hoist systems also include an independent mechanism to retain the hoist in the raised position in accordance with and meeting the requirements of AS 1418.8 (i.e. body props).
- Added the following recommendations for Installation requirements of Body mount type requirements - Short rigid bodies — tipper bodies - Body props:
  - Where a body prop is installed, ensure its design and installation is validated by a competent and suitably experienced engineer.
  - Ensure that the design of impact locations are considered, including ensuring that it is not possible to mistakenly place the prop in a location at which it is not effective.
  - Ensure that the body prop is permanently connected to the vehicle and readily accessible.
  - Ensure that body props can be operated independently and without special skill, strength, protective equipment or protective clothing, or tools.
- Updated the reference for dangerous goods requirements to the Australian Code for the Transport of Dangerous Goods by Road and Rail from Australian Standard AS 2809 - Parts 1 to 5.
- Removed references to light vehicles in Recommended dimensions — NB2 and NC vehicles.
- Added the following recommendations about body dimensions:
  - Body overall width:
    - ≤ (Overall width across rear tyres) + 300 mm, unless specified otherwise by the manufacturer.
    - Do not allow width to exceed 2.5 m, unless exempted by the relevant heavy vehicle regulator.
  - Rear overhang:
    - Must be the lesser of 3.7 m or 60% wheelbase, unless exempted by the relevant heavy vehicle regulator.
  - Overall length:
    - Must not exceed 12.5 m, unless exempted by the relevant heavy vehicle regulator.

J2-Fitting of Truck-Bus Body

- Clarified the scope of permissible modifications by specifically noting the types of modifications covered:
  - fitting of a bus body (i.e. a passenger carrying pod) onto a truck cab-chassis, with change of GVM, seating capacity and of ride height.
  - mounting a compliant bus body on a compliant rolling chassis.
- Clarified the scope of permissible modifications by specifically noting the types of modifications not covered:
  - certification of an omnibus body .
- Added not that if a SSM identification plate approval (IPA) holder retrofits a bus body to an in-service truck for which the fitting would be covered by the IPA at the SSM, only perform the modification in accordance with this code if it is also performed in accordance with that SSM IPA.
- Added the following requirements for Certification requirements:
  - Ensure the body installation meets the requirements of, and is certified in accordance with VSB6 modification codes J1 and J2.
  - Where the base vehicle used has not been tested and certified at the new category's requirements, ensure that all applicable braking requirements are validated. For example, an NC category vehicle fitted with a truck bus body must meet ME requirements and therefore the higher braking requirement of ME vehicles.
  - Ensure the modified vehicle complies with the emergency exit requirements of either ADR58/.. or ADR44/.. (as applicable).
- Extended specific requirement for vehicles certified under Modification Code J2covering driver visibility and door function with:
  - While it is acceptable to detach a truck-bus driver's cabin from the passenger compartment (bus body), ensure effective communication can be maintained between the driver and passengers at all times. This can be achieved either directly or by use of audio/visual technologies.
- Added the following requirements for Certification requirements of New vehicles requirements:
  - If the truck cab-chassis is a new vehicle as defined under the Motor Vehicle Standards Act 1989, certify it using the SSM approval process administered by the Commonwealth Department of Infrastructure and Regional Development (DIRD).
  - Do not use this code to circumvent the intent of the SSM approval process, for example, by certifying a bus body fitting to a new truck cab-chassis that is registered but has not been supplied to market or used in transport.

- Clarified the requirements around the effective date of manufacture for vehicles certified under Modification Code J2.
- Removed restriction of vehicles being 12 months old before being able to be certified under Modification Code J2.
- Removed specific mention of the requirement for a Truck-Bus that requires state of territory registering authority approval, the state of territory registering authority may require a detailed professional engineering report.

J3-Fitting of roll-over or falling object protection system

- New code which covers the installation of roll-over or falling object protection system where the ROPS/FOPS device:
  - can show compliance with any of the following:
    - AS 2294; or
    - ISO3471; or
    - an equivalent international standard.
  - is installed in accordance with
    - the manufacturers requirements; and
    - the requirements of VSB6 modification code J3.
- Scope of modifications covered:
  - installation of an external ROPS/FOPS on a motor vehicle in accordance with the ROPS/FOPS manufacturer's instructions where these instructions meet the requirements of this modification code.
- Modifications specifically not covered:
  - installation of a ROPS/FOPS internal to the cabin compartment.
  - certification of a ROPS/FOPS.
  - installation of ROPS/FOPS where the manufacturer instructions are unavailable or do not meet requirements of this modification code.

Section K - Cabin

K-Overview

- Clarified the scope of Section K by including specific mention of the removal of seats and seatbelts.
- Changed Modification Code K1 from requiring seatbelts to conform with AS/NZS 2596 to ADR 4/.. .
- Clarified the scope of Modification Code K1 by the specific addition of "removal of seats and seatbelts.
- Added Modification Code K6 (see below).
- Removed ADRs that are not applicable to heavy vehicles from the list of Related Australian Design Rules.
- Removed duplication of ADR Definitions.
- Removed all references to VSB5 as the latest revision does not apply to heavy vehicles.
- Added references to ADRs 3/.., 4/.. and 5/.. as applicable.

K1-Seating capacity alteration, seat, seatbelt and anchorage installation

- Removed design and location instructions for seat and seatbelt anchorage from text as mounts are required to be of an approved design via manufacturer's guidelines or K2 which is to include these details.
- Changed from requiring seatbelts to conform with AS/NZS 2596 to ADR 4/.. .
- Clarified the scope of permissible modifications by specifically noting the types covered:
  - removal of seats and seatbelts.
- Clarified the scope of permissible modifications by specifically noting the types not covered:
  - installation of seats or seatbelts to trailers.
- Removed ADRs that are not applicable to heavy vehicles from the list of Related Australian Design Rules.
- Added the following requirements to Compliance requirements:
  - If a seat, seat anchorage, seatbelt or seatbelt anchorage is certified to ADR 3/.. , 4/.. , 5/.. or 68/.. (as applicable), ensure it complies fully with all relevant requirements; partial compliance is not acceptable.
  - If a vehicle is modified for use as a motorhome, modify non-designated seating positions in accordance with Administrator's Circular 0-4-12 Certification of Campervans and Motorhomes.
  - Review the approval of the seat, seat anchorage, seatbelt or seatbelt anchorage to verify that the combination is applicable to the modified vehicle.
- Added note that as a United Nations Economic Commission for Europe (UNECE) certification is vehicle specific, a certification may not be suitable for showing compliance where seat, seat anchorage, seatbelt or seatbelt anchorage of another type is fitted.
- Changed the requirement for exchanging or converting seats to another of an alternative manufacturer, or bench seats to bucket seats and vice versa from explicitly requiring compliance with the ADRs, to requiring the seats to be fitted in accordance with the manufacturer's guidelines.
- Added the following requirements to Design requirements:
  - Where SRS airbags are fitted, ensure:
    - any replacement seat does not impede safe operation of the airbag.
    - modifications are performed in accordance with the vehicle manufacturer's instructions.
    - existing airbags are not de-activated or removed.
  - Where a vehicle is certified as UNECE R29 compliant, ensure that any seating modifications are carried out in accordance with the manufacturer's recommendations and that UNECE R29 compliance is maintained.
  - Where seats are installed in a part of the vehicle primarily designed to carry goods, i.e. utility or truck trays, ensure the seats are enclosed by means of a structure. Do not enclose them in a canopy or cage fitted to the vehicle unless it is an appropriately rated roll cage.
    - With additional note to: Consult with all relevant regulators as there may be additional requirements given that this is a road rules requirement and may vary across jurisdictions.
  - Ensure that additional seat(s) positioning is such that it is away from areas where there would be a high probability of injury to the occupant(s) in an accident.
  - Ensure access to any additional seats is unimpeded.
  - Ensure where any additional seats are installed, access to exits, access aisles, doors, door latches, folding seat controls, etc. is unobstructed.
  - Ensure that seat backs, arm rests and other fittings are padded to minimise injury to occupants in an accident.
  - Ensure all rearward facing seats fitted with irremovable head restraints.
- Added the following recommendations to Design requirements:
  - If seats are installed in a part of the vehicle primarily designed to carry goods, i.e. utility or truck trays, provide a substantial barrier that divides the passenger area from the cargo area. The barrier must comply with the performance standards of the Load Restraint

Guide as prepared by the National Transport Commission (NTC) (http://www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/).
    - With additional note to: Consult with relevant regulators as they may have additional requirements, given that this is a road rules requirement and may vary across jurisdictions.
- Added the following requirements to Design requirements for Seatbelt installation requirements:
    - Ensure that all additional or replacement seatbelts are in serviceable condition.
- Added the following requirements to Design requirements for Seatbelt installation requirements:
    - Ensure that seatbelts are either of the same style as originally fitted by the truck manufacturer or upgraded to lap/sash type (except for side facing seats).
    - Use a spacer to allow the seatbelt to rotate.
- Added the following requirements to Design requirements for Seat and seatbelt removal requirements:
    - When seating positions are permanently removed from the vehicle and its seating capacity reduced, certify the new seating capacity in accordance with this modification code.
    - If a seating position is permanently removed, ensure the following:
        - blank off or block all holes in the bodywork.
        - any supplementary restraint system (SRS) functions correctly as originally designed.
        - Added note that if any item is removed from the SRS, such as seat and seatbelts with pre-tensioners, the whole system may become inoperable. The modifier must consult the vehicle manufacturer for guidance when an SRS is fitted.
    - If reducing the seating capacity results in a change of vehicle category, ensure a report is issued by a professional engineer registered with a professional registration body or an agent registered with the Road Vehicle Certification System (RVCS) showing that the vehicle complies with all ADRs that apply to the vehicle in its new category.
    - When removing the seat ensure the seatbelt is also removed.
- Removed guidance on seat anchorage construction as this is covered by the K2 design certificate.
- Removed guidance on seatbelt anchorage construction as this is covered by the K2 design certificate.
- Removed guidance on seatbelt anchorage location as this is covered by the K2 design certificate.

K2-Seat anchorage and seatbelt anchorage location:

- Clarified the scope of permissible modifications by specifically noting the types not covered:
    - installation of seats or seatbelts to trailers.
- Removed ADRs that are not applicable to heavy vehicles from the list of Related Australian Design Rules.
- Added the following requirements to Compliance requirements:
    - If a seat anchorage or seatbelt anchorage is certified to ADR 3/.. or 5/.. , ensure it complies fully with all relevant requirements, partial compliance is not acceptable.
    - Ensure all work is performed in accordance with recognised engineering standards.
- Added the following recommendations to Compliance requirements:
    - Include instructions in the K2 certification similar to :
        - Do not perform modifications on any part of the cabin affected by rust, unless the rusted components are being repaired or replaced.
        - Do not allow modifications to cause fuel leaks, exhaust or road fumes to enter the cabin.
    - Where possible, duplicate specifications offered by the vehicle manufacturer.
- Removed reference to edge loading being undesirable in Seatbelt anchorage construction requirements.
- Added the following requirements to Design requirements for Seat anchorages:
    - Ensure seat anchorages can withstand load requirements specified in ADR 3/.. as applicable.
    - Ensure seat anchorages are physically tested or fully certified by engineering calculations in accordance with ADR 3/.. as applicable.
    - Provide comprehensive and easily understood installation instructions for the seat anchorages to allow an accredited K1 AVE to certify their installation.
- Added the following requirements to Design requirements for Seat anchorages:
    - Provide comprehensive and easily understood installation instructions for the seatbelt anchorages to allow an accredited K1 AVE to certify their installation.
    - Design the seatbelt anchorages to use 7/16 inch UNF SAE Grade 8 bolts, which are long enough to fully engage the thread of the anchorage or nut when tightened.

K3-Cabin Conversion

- Clarified the scope of permissible modifications by specifically noting the types covered:
    - any other significant modifications to the cabin, including cutting of the cabin or sleeper for cooling/ventilation/windows.
- Clarified the scope of permissible modifications by specifically noting the types not covered:
    - modifications that reduce the structural integrity of the cab or transmission tunnel where fitted.
- Added ADR 84/.. to list of related standards.
- Added the following requirements to Compliance requirements:
    - Ensure the modified cabin complies with all ADRs that applied to the original cabin.
    - Other than where the cabin is converted to an island cab, 3/4 cab, or similar, where the cabin was manufactured to comply with UNECE R29 perform all modifications in accordance with manufacturer's instructions and validate the modifications ongoing compliance with UNECE R29.
    - Do not allow the modification to compromise the structural integrity of the cabin.
    - Ensure the modified vehicle complies with all applicable dimensional requirements.
    - Keep a copy of the validation or new UNECE R29 compliance report with the modification certificate.
- Duplicated the following requirements from the existing K3 checklist to Compliance requirements:
    - Ensure that if the exhaust is modified it is in accordance with and certified to VSB6 Modification Code A4.
    - Ensure that any alterations to the steering system are in accordance with and certified to VSB6 Modification Code E2.
    - Re-position brake control valves in accordance with and certify them to VSB6 Modification Code G1.

- Ensure that any chassis alterations are in accordance with and certified to VSB6 Modification Code H4.

- Added the following recommendation to Compliance requirements:
  - If a cabin is converted to an island cab, 3/4 cab, or similar, and the cabin was manufactured to comply with UNECE R29, perform all modifications in accordance with the manufacturer's instructions and validate the modification's ongoing compliance with UNECE R29.
- Added the following requirements to Design requirements:
  - If a seat, seat anchorage, or seatbelt anchorage is certified to ADR 3/.. , 4/.. , or 5/.. , ensure it complies fully with all relevant requirements; partial compliance is not acceptable.
  - If seats are installed in a part of the vehicle primarily designed to carry goods, i.e. utility or truck trays, ensure the seats are enclosed by means of a structure. Do not enclose them in a canopy or cage fitted to the vehicle unless it is an appropriately rated roll cage.
- Added advisory note to consult with relevant regulators as they may have additional requirements, given that this is a road rules requirement and may vary across jurisdictions.
- Added the following recommendations to Design requirements:
  - If seats are installed in a part of the vehicle primarily designed to carry goods, i.e. utility or truck trays, provide a substantial barrier that divides the passenger area from the cargo area. The barrier must comply with the performance standards of the Load Restraint Guide as prepared by the NTC (http://www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/).
  - Where possible, duplicate specifications offered by the vehicle manufacturer.
- Added the following requirements to clarify the Installation requirements for Replacement cabins:
  - If replacing a cabin results in a vehicle with more than one unique identifier, i.e. chassis number, vehicle identification number (VIN) or identification, or compliance plate, obtain a surrogate VIN and ensure that identification plates are not removed from the vehicle or the replacement cabin.
  - Obtain the surrogate VIN or chassis number from the vehicle registering authority and use this to identify and register the newly modified vehicle.
  - Ensure the modification plate for cabin conversion shows the new surrogate VIN or chassis number.
  - Stamp the surrogate VIN or chassis number on both the chassis and on the modification plate.
- Added advisory note that it is an offence to remove or tamper with identification plates or identifying numbers such as the VIN or chassis number.
- Added the following requirements to the Installation requirements for Reposition cabin controls:
  - If replacement controls are used, the certifying AVE assesses them to ensure the mechanism is adequately strong and operable.
  - If the steering column, accelerator, brake or clutch controls are repositioned, ensure they can be operated through the full working range from the driver's normal driving position.
- Added the following recommendations to the Installation requirements for Reposition cabin controls:
  - If desired, use original components where the steering column, accelerator, brake or clutch controls are repositioned.
- Added the following requirements to the Installation requirements for Reposition gear change linkage:
  - If replacing the gear change mechanism, ensure the mechanism is adequately strong and operable.
  - If the gear change mechanism is repositioned ensure it can be operated through the full working range from the driver's normal driving position.
- Added the following recommendations to the Installation requirements for Reposition gear change linkage:
  - If the gear change mechanism is repositioned, the original components may be used.

K5-Installation of wheelchair occupant restraint system

- Clarified the scope of permissible modifications by specifically noting the types not covered:
  - installation of wheelchair occupant restraint assemblies and anchorages to trailers.
- Added the following requirements to Compliance requirements:
  - If a vehicle is modified for use as a motorhome, modify non-designated seating positions in accordance with Administrator's Circular 0-4-12 Certification of Campervans and Motorhomes.
  - If wheelchair occupant restraint systems are installed in a part of the vehicle primarily designed to carry goods, i.e. utility or truck trays, ensure the seats are enclosed by means of a structure. Do not enclose them in a canopy or cage fitted to the vehicle unless it is an appropriately rated roll cage.
- Added advisory note to consult with relevant regulators as they may have additional requirements, given that this is a road rules requirement and may vary across jurisdictions.
- Added the following recommendations to Compliance requirements:
  - If wheelchair occupant restraint systems are installed in a part of the vehicle primarily designed to carry goods, i.e. utility or truck trays, provide a substantial barrier that divides the passenger area from the cargo area. The barrier must comply with the performance standards of the Load Restraint Guide as prepared by the NTC (http://www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/).
  - Where possible, duplicate specifications offered by the vehicle manufacturer.
- Removed specific references to clear space requirements and instructions for installation as the requirement is to comply fully with AS/NZS 10542.1.
- Removed requirement that the area where the wheelchair(s) is restrained is not be used as a luggage area when not occupied by a wheelchair.
- Added the following requirements to Design requirements for Transport of wheelchair:
  - Ensure a vehicle used to carry more than one, or a variety of wheelchairs, is fitted with emergency exits in accordance with ADR 44/.. , 58/.. or state or territory passenger transport requirements (as applicable).
- Removed the requirement for vehicles used to carry a variety of wheelchairs or more than one wheelchair to meet the following emergency exit requirements:
  - The wheelchair installation should not obscure or obstruct any emergency exits in any of its states-occupied or otherwise.

- Means of emergency exits should remain free of obstructions and be capable of being opened outwards from both inside and outside.
- Means of emergency exit should be identified by a prominent notice inside and outside the vehicle, displaying the words “EMERGENCY EXIT”, and by words and/or symbols indicating the method of opening, unless, by virtue of the exit design, the method of opening is obvious.

- Changed the following requirements to recommendations of design requirements for Transport of wheelchair:
  - For vehicles used to provide passenger transport services, ensure the vehicle also complies with any requirements imposed by state or territory passenger transport authorities.
- Removed the recommendation that in case of Hire and Reward vehicles (e.g. Taxis) that the Taxi Licensing Section of the relevant State jurisdiction be contacted to determine any unique requirements before modifications are commenced.

K6-Child restraint anchorage installation

- New code which covers the installation of Child restraint anchorages.
- Scope of modifications covered:
  - location and installation of child restraint anchorage into vehicles.
  - installation of an anchor bar, vertical post, universal frame or twin cab device for child restraint.
- Modifications specifically not covered:
  - installation of restraints that have not been tested or approved to ADR 34/.. .
  - installation of seatbelts — see VSB6 Modification Code K1.

Section M – Fuel systems

M-Overview

- Removed ADR 17/.. from list of relevant ADRs.
- Extended scope to specifically cover changing the shape of a fuel tank.
- Recommendation to complete checklist has been changed to a requirement.

M1-Fuel System Alterations

- Adjusted scope so that the all covered modifications require the same level of validation regardless of vehicle age.
- Clarified the scope by adding items that are not covered.
- Removed requirement for vehicles which were manufactured to comply with the repealed ADR 17/.. to continue to comply directly with ADR 17/.. when modified.
- Added the following requirements as design requirements for Fuel tank construction requirements:
  - Ensure that each fuel tank is designed in accordance with good engineering practice.
- Changed the following requirements to recommendations of design requirements for Fuel tank construction requirements:
  - Ensure that each fuel tank can withstand an internal pressure of 150% of the safety vent design pressure (P) derived from the formula for diameter shown in the performance recommendations of this modification code.
  - Fit each fuel tank with a safety vent or fusible plug.
  - Ensure each fuel tank provides for at least 5% air space when full to allow for the expansion of fuel without spilling.
  - Do not let fuel tank drain fittings (other than fuel cross-over pipes and related fittings) extend by more than 20 mm beyond the surface of the fuel tank on which they are fitted, or a plane tangential to at least three points on the fuel tank located within 75 mm of the centre line of the fittings.
  - Do not let fuel tank drain fittings (other than fuel cross-over pipes and related fittings) extend by more than 20 mm beyond the surface of the fuel tank on which they are fitted, or a plane tangential to at least three points on the fuel tank located within 75 mm of the centre line of the fittings.
- Added the following recommendations to design requirements for performance recommendations:
  - Rate of filling of fuel tanks without spillage from tank:
    - 45 L/min for tanks used to store petrol, motor spirit or petroleum spirit.
    - 66 L/min for all other tanks.
  - Rate of total leakage from a fuel tank and fittings:
    - do not exceed 30 g/min when filled with normal fuel and inverted for 5 min relative to its installed position in the vehicle.
- Added formula for calculating the recommended vent design pressure.
- Clarified the installation requirements for fuel tank mounting for fuel tanks not being permitted to be mounted forwards of the front axle with the addition of the following requirements:
  - On motor vehicles, do not mount the fuel tank forward of the front axle.
  - On semitrailers, mount the fuel tanks between the landing legs and the front axle.
- Added the following requirements as installation requirements for Fuel systems and lines requirements:
  - Design the filler pipe to prevent overflow from a filling operation spilling onto any part of the exhaust or electrical systems, other than fuel level indicator assemblies.
  - Meet the engine manufacturer's requirements for inlet fuel temperature as failure to do so may result in reduced engine performance or damage.
- Changed the following requirement to a recommendation of installation requirements for fuel systems and lines requirements:
  - Avoid positioning fuel system components so that they are the widest part of the vehicle.
- Clarified the installation requirements for fuel systems and lines requirements and the fuel return lines with the addition of the following requirement:
  - Connect fuel return lines in accordance with original equipment manufacturer’s requirements. When the manufacturer’s requirements are unavailable, ensure the fuel can return to the tank from which it was drawn. If fuel is returned to another tank in the fuel system, it is advisable that crossover lines allow for sufficient transfer of fuel between tanks. This is common in road train applications.
- Added recommendations for fuel tank testing.

Section P – Tow couplings

P-Overview

- Removed the installation of front mounted Pin Type Tow Couplings.
- Included 'other couplings' to permissible couplings covered by the scope.
- Included specific note regarding use of 50 mm ball couplings on vehicles with GVM > 5 tonne.
- Included reference to ADR 43/.. and 63/.. to related ADR section.
- Added additional types of vehicle combinations to Tow coupling and fifth wheel applications along with guidance on coupling selection.
- Removed references to 'tag' trailer.

P1-Towbar and coupling installation other than fifth wheels and kingpins

- Clarified the scope of permissible modifications by specifically noting the types covered:
  - selecting and mounting towbars and their brackets.
  - selecting and mounting drawbars and eyes.
  - installing, modifying, replacing or increasing the rating of a towbar.
  - installing, modifying, replacing or increasing the rating of a tow coupling other than a fifth wheel or kingpin.
  - installing, modifying, replacing or increasing the rating of a trailer drawbar.
  - changing a trailer tow coupling to a different type, specification or rating.
  - changing a motor vehicle tow coupling to a different type, specification or rating.
  - Safety chain attachment points.
- Clarified the scope of permissible modifications by specifically noting the types not covered:
  - installation of trailer air brake controls (see VSB6 Modification Code G5).
  - fitting of any component that does not comply with the ADRs or relevant heavy vehicle standards regulation.
- Provided additional guidance on coupling selection.
- Removed advice on coupling design.
- Added the following advice on the requirements for the manufacture of towbars and tow couplings:
  - Towbars and tow couplings are safety critical components and are required to undergo rigorous testing in accordance with ADR 62/.. . Whenever a towbar or tow coupling is manufactured it must be verified as complying with ADR requirements, including where a towbar or tow coupling is manufactured individually or in low volumes.
- Removed application specific guidance on drawbar eye D-value.
- Added the following requirements to design requirements for tow coupling selection:
  - Calculate the required D-value for the particular application to select a coupling and design the attachment assembly of appropriate strength rating.
  - Ensure the capacity of all towing components is at least equal to the D-value rating requirement of the vehicle combination.
  - Ensure the coupling is certified for road use.
  - Ensure the coupling meets the requirements of ADR62/.. .
- Added the following recommendations to design requirements for tow coupling selection:
  - Use fifth wheels for applications that are subject to high vertical loads imposed on the coupling assembly and where the articulation point does not need to be at the rear of the vehicle, e.g. standard semitrailers.
- Corrected reference to requirement for road train coupling height to refer to ADR 63/.. .
- Removed specific requirement:
  - In the case of high "D-Value" couplings, substantial reinforcement and bracing will be required for tow bar or towing members attach to main frame, Cross bracing of the rear overhang section may be required.
- Removed requirement for hardened washers to be used under both the nut and bolt head where installed on aluminium alloy chassis.
- Removed maintenance requirements for couplings as this is not part of the modification of the vehicle.
- Added the following requirements to design requirements for Drawbar strength and design:
  - Ensure drawbar length on a dog trailer or converter dolly does not exceed 5 m.
  - For road trains, ensure the:
    - length exceeds 3 m but does not exceed 5 m.
  - For rigid drawbar trailers ensure the distance between the coupling pivot point and the centre of the axle group does not exceed 8.5 m.
- Added instruction that where manufacturer's guidelines have been produced, ensure that the installation complies with these guidelines rather than VSB6.
- Added the following note:
  - The majority of couplings currently on the market will be accompanied with installation instructions provided by their manufacturer.
    Where provided, these instructions must be followed.
    Where installation instructions are not provided for a coupling, consideration should be given to whether the coupling is appropriate for road use.
- Added the following requirements to Installation requirements for towbar:
  - Ensure where the chassis or cross-member is reinforced to provide adequate strength for the tow member that all chassis modifications are certified in accordance with VSB6 Section H.
  - Ensure towbars can show compliance with ADR 62/.. either by:
    - calculations approved by the administrator of vehicles (Department of Infrastructure and Regional Development (DIRD); or
    - testing conducted by a registered Road Vehicle Certification System test facility or National Association of Testing Authorities facility.
  - Ensure the bolt pattern that connects the towbar to the chassis of the truck is designed with adequate strength for the intended rating, and meets or exceeds the ADR 62/.. strength requirements.
  - Ensure a detailed assessment of the bolt group has been provided which takes into account the different loads that are imposed on each bolt in the group.
  - Tension all towbar mounting bolts using recognised procedures and accurate tools to the bolt manufacturer's torque requirements.
- Added the following recommendation to Installation requirements for towbar:

- Install suitable hardened washers under both the nut and bolt head.
- Added extensive guidance and requirements for the installation of 50 mm ball couplings.
- Changed the requirement for mounting and gusset plate minimum thickness to as specified by the coupling manufacturer from 16 mm and 10 mm respectively.
- Added the following requirements to Installation requirements for Drawbar Installation - Drawbar welding considerations - Drawbar eye (where no manufacturer instructions exist):
  - For a bolt-in drawbar eye, take care that the rear nut has enough access space for torque wrench.
  - For a bolt-in drawbar eye, take care that the socket welding is performed according to the manufacturer's specifications.
- Updated Safety chains and safety chain attachment point guidance to align with ADR 62/.. .
- Added the following requirements to Installation requirements for Safety chains and safety chain attachment points - Safety chains:
  - Ensure the fitting (including the retrofitting and replacement) of chains complies with ADR 62/.. requirements and is in accordance with manufacturer instructions.
  - Ensure the connectors used to attach the safety chain to the towing vehicle (known as chain connectors or coupling links) are appropriately rated.
  - Ensure the chains fitted are as short as possible and are positioned so that:
    - the risk of them causing inadvertent coupling release is minimised.
  - Ensure safety chains are fitted to all trailers:
    - without emergency brakes
    - with rigid drawbars, other than converter dollies
    - meet the requirements of ADR62/.. , including the need for two safety chains
    - via attachment points that meet the requirements of ADR 62/.. .
- Added the following requirements to Installation requirements for Safety chains and safety chain attachment points - Safety chain attachment points:
  - Ensure safety chain attachment points have demonstrated compliance with ADR 62/.. (testing), can withstand the forces prescribed in ADR 62/.. .and have been fitted, rated and marked accordingly.
  - Ensure safety chain attachment points are positioned to minimise the risk of them causing inadvertent coupling release.
  - Ensure two safety chain attachment points are fitted to vehicles that:
    - are not designed for use in a road train combination (optional); and
    - have a towbar.
- Changed requirement for safety chain attachment points on towbars which have capacity to tow trailers with an aggregate trailer mass of over 3.5 tonnes from 2.5 tonnes, in accordance with ADR 62/.. .
- Removed references to manufacturer specific products for coupling links.

P2-Fifth wheel and kingpin installation

- Clarified the scope of permissible modifications by specifically noting the types not covered:
  - fitting components not designed for automotive use or on-road use.
  - fitting of any component that does not comply with the Australian Design Rules (ADRs) or relevant heavy vehicle standards regulation.
  - relocation of a previously certified fifth wheel within the limits of the mounting angles already fitted.
- Duplicated the following requirement from Modification Code S9 that double oscillating fifth wheels are not recommended for B-double or road train combinations unless:
  - the semitrailer design requires torsional stresses to be minimised, i.e. road tank trailers; and
  - the degree of rotation allowed around the roll axis of the fifth wheel coupling is restricted to prevent roll instability.
- Added recommendation to seek guidance from the fifth wheel manufacturer as to the fifth wheel type that best suits the application.
- Changed the following recommendation to a requirement of Installation requirements for Securing the base plate to the sub-frame :
  - Ensure the bolt hole clearance is no more than 1 mm.
- Added the following requirements to Design requirements for Securing the base plate to the sub-frame – Fixed fifth wheel mounting – Rotating (ballrace) fifth wheels:
  - Ensure the bolt spacing between the base plate to the fifth wheel angles (see Figures 18 and 19) is within the range:
    - d = 100 to 225mm for M16 bolts
    - d = 100 to 300mm for M20 bolts.
    - spacing around the ballrace/pivot may be extended if the bolting can be shown to give at least equivalent mounting strength/security.
- Added the following recommendations to Design requirements for Securing the base plate to the sub-frame – Fixed fifth wheel mounting – Rotating (ballrace) fifth wheels:
  - If using welding as an attachment method, consult the turntable manufacturer to determine if there are special requirements.
  - Ensure all welds are carried out by competent persons, trained in welding techniques.
- Corrected welding requirements for fifth wheel pedestals by clarifying the minimum weld requirement is 450 mm per fifth wheel pedestal rather than per foot (or 300mm).
- Added the following recommendations to Installation requirements for Installing sliding assemblies – Attachment by bolts:
  - Attach slider stops to slider assembly or slider sub-frame, not directly to the vehicle chassis.
- Added the following recommendations to Installation requirements for Installing sliding assemblies – Attachment by welding:
  - Do not place any weld on the stop face, such as a welded front slide stop.
- Added the following requirements to Installation requirements for Installing fifth wheels:
  - Ensure the location, mounting and strength of fifth wheels comply with requirements of VSB6 Section P and with the relevant ADRs, AS/NZS4968 *Heavy Road Vehicles – Mechanical Coupling Between Articulated Vehicle Combinations* and AS 2174 *Heavy Road Vehicles – Mechanical Coupling Between Prime Movers and Semitrailers – Interchangeability Requirements.*
  - When determining the location of the fifth wheel calculate the laden steer-axle mass to ensure:

        - steer axle/s do not exceed the manufacturer's or regulatory mass limits.
        - effective steering capability is maintained.
    - For fifth wheels used, or intended for use, in a B-double or road train configuration, ensure the strength of the coupling is appropriate for multi-combination use.
- Added the following recommendations to Installation requirements for Installing fifth wheels:
    - When replacing or repositioning fifth wheels or turntables, if existing angles are reused, ensure any new holes are at least 3d or 50 mm from another hole, where d is the diameter of the hole.
    - Where rivets were previously used, select a bolt that is at least the size of the original rivet.
- Added the following requirements to Installation requirements for Installing fifth wheels – Fifth wheel wear plates:
    - Repositioning the kingpin to ensure correct engagement with the fifth wheel is highly likely to make the kingpin installation non-compliant.
    - If fitting a low friction (nylon, greaseless, Teflon) or other wear plate to a fifth wheel, ensure the fifth wheel manufacturer provides assurance regarding the suitability of the product. If this is unavailable, ensure the wear plate manufacturer can provide evidence that the fifth wheel will continue to comply with the strength and dimensional requirements of ADR62/.. and AS 4968.2.
- Simplified guidance on the selection of weld-in and bolt-in king pins.
- Removed the following notes:
    - With the registered Gross Combination Mass of vehicles increasing to higher levels, it is important to ensure that all king pin installations, be rated appropriately.
    - CAUTION: If the king pin supplier cannot supply fitting instructions from the pin manufacturer, purchase your replacement pins from a professional supplier who can.
- Added the following requirements to Installation requirements for Installing kingpins for use with fifth wheel assemblies:
    - If a bolt-in kingpin is employed, weld the housing into the trailer chassis and install or replace the kingpin into the housing in accordance with the manufacturer's guidelines.
    - Tension all kingpin retaining bolts correctly to the bolt manufacturer's torque requirements.
- Added the following requirements to Installation requirements for Installing kingpins for use with fifth wheel assemblies – Machining of kingpins:
    - In accordance with *AS 4968.3 Heavy road vehicles—Mechanical coupling between articulated* vehicle, do not re-machine or build up kingpins by welding to achieve or restore required dimensions.
- Removed road train vehicle specific requirements duplicated ADR 63/.. .

Section Q – Vehicle mounted lifting systems

Q-Overview

- Section Q has been merged into Section R.
- Section R has been significantly revised. It is imperative that this new version of Section R is re-read to ensure a full understanding of the requirements and recommendations is established.
- New modifications will not be able to be certified under Section Q from 1 October 2017.
- Contact your relevant Approved Vehicle Examiner accreditor to discuss your ability to certify modifications under Modification code R1.

Q1- Truck Mounted Lifting Systems Slewing

- Modification Code Q1 has been merged into Modification Code R1.
- Modification Code R1 has been significantly revised. It is imperative that this new version of Section R is re-read to ensure a full understanding of the requirements and recommendations is established.
- New modifications will not be able to be certified under code Q1 from 1 October 2017.
- Contact your relevant Approved Vehicle Examiner accreditor to discuss your ability to certify modifications under Modification code R1.

Section R – Vehicle mounted lifting systems

R-Overview

- Merged Section Q into Section R to cover both slewing and non-slewing vehicle mounted lifting systems (VMLS) and wheelchair loaders.
- Section R has been significantly revised. It is imperative that this new version of Section R is re-read to ensure a full understanding of the requirements and recommendations is established.
- Removed references to light vehicles.
- Expanded the scope of Section R to specifically include:
    - hook lifts
    - side lifts
    - side or rear operated platform loaders.
- Added not that Section R does not cover the fitting of lifting systems designed to tow or transport vehicles (except where a VMLS is intended for all-up operation) which must be installed and certified in accordance with VSB6 Section T — Tow trucks.
- Extended the scope of permissible modifications under modification code R1 by specifically noting that the following is covered:
    - installation of a type of VMLS where there is no Australian Standard, but where the system and installation complies with all relevant sections of this code.
- Merged the existing Q1, and two R1 assessment report forms into one form.
- Extended Modification code R2 to include relevant requirements and recommendations from Section Q.
- Added the following to cover VMLS for which there is not an Australian Standard:
    - For some types of VMLS there is no Australian Standard that applies.
    - For example, hook bin lift devices are a type of VMLS that are not provided for by any Australian Standard. A hook bin lift system may be installed to a vehicle only if the system, and its installation, complies with the requirements of this section of VSB6.

R1-Installation of vehicle mounted lifting systems

- Modification code R1 has been extended to include the provisions of section Q and now covers both slewing and non-slewing vehicle mounted lifting systems (VMLS).
- Modification Code R1 has been significantly revised. It is imperative that this new version of Section R is re-read to ensure a full understanding of the requirements and recommendations is established.
- Incorporated sub-frame to chassis and loader to sub-frame installation requirements and recommendations from section Q.
- Adjusted the scope of permissible modifications under modification code R1 by specifically noting that the following are covered:
  - reinforcement of a vehicle chassis for the purpose of fitting a VMLS
  - installation of a VMLS certified as complying with the requirements of AS/NZS 1418 Cranes, hoists and winches
  - installation of a type of VMLS where there is no Australian Standard, but where the system and installation complies with all relevant sections of this code.
- Adjusted the scope of permissible modifications under modification code R1 by specifically noting that the following are not covered:
  - cutting of the chassis to facilitate the installation of a VMLS (see VSB6 Section H — Chassis).
  - installation of a type of VMLS for which there is an Australian Standard, but the system and installation does not comply with the standard.
  - installation of a type of VMLS for which there is not an Australian Standard, and where the system and installation does not comply with this code.
  - fitting equipment that is not suitable for automotive use.
  - installation of a body (see VSB6 Section J — Body).
  - conversion of a motor vehicle into a dedicated self-propelled mobile crane (specific modification application to the relevant heavy vehicle regulator required).
- Added the following requirements to Compliance requirements:
  - Where an Australian Standard exists, ensure all systems of that type comply with the relevant Australian Standard as well as VSB6 Section R requirements.
  - Where an Australian Standard does not exist, the requirements of VSB6 Section R apply and the VMLS is to be fully tested, evaluated and certified as appropriate for the application.
  - If the requirements of the Australian Standard and this section are inconsistent, the requirements of the Australian Standard take precedence.
  - If a type of VMLS is not coved by AS/NZS 1418, for example bin hook lifts, install the VMLS in accordance with this modification code, including stability requirements, vehicle loading, attachment to the chassis and testing.
  - Additional requirements applicable to the modifications certifiable under this code may be found within the relevant parts of AS/NZS 1418, including Part 11. Obtaining a copy of the relevant parts of these Australian Standards is strongly recommended.
- Requirement to make available a copy of Australian Standard 1418 Part 11 for the AVE has been changed to a strong recommendation.
- Removed specific requirement of VMLS rating from note that VMLS may be required to comply with additional requirements outside of VSB6 such as registration with workplace health and safety regulators.
- Added the following recommendations to Compliance requirements:
  - Before starting modifications consult with the vehicle, body and VMLS manufacturers or suppliers to establish suitability of the vehicle for the selected loader type, capacity and size.
  - For VMLS manufactured outside of Australia and not built in accordance with AS/NZS 1418, ensure that it provides equivalent or superior results to AS/NZS 1418 if it is covered by AS/NZS 1418.
- Added the following recommendations to Design requirements:
  - If these are unavailable then, prior to installation, use calculations to ensure that the vehicle has sufficient chassis reinforcement within the chassis design limits to withstand the load moment induced by all dynamic forces imposed during operation.
- Updated requirement of Design requirements for Mass and dimensions requirements coving protrusions to align with wording from ADR 42/..
- Added the following requirements to Design requirements for Mass and dimensions requirements:
  - When not in operation, ensure that no part of the VMLS and associated components protrudes more than 150 mm past the vehicle's outer extremity on either side and the maximum overall width does not exceed regulatory limits.
  - If a VMLS or associated component protrudes more than 150 mm either side of the vehicle, and is less than 500 mm thick from top to bottom, ensure the vehicle has:
    - a warning light attached to the vehicle
    - a delineator attached to the front and rear of the projection on each side of the vehicle so that its reflective surface is facing forward for the front delineator and rearwards for the rear delineator.
    - A delineator is a yellow, rigid piece of material that is at least 300 mm long and at least 300 mm wide; and complies with Class 400 or 2 of Australian Standard AS 1906 Retro-reflective Materials and Devices for Road Traffic.
  - If an installation results in a vehicle's dimensions exceeding regulatory limits, do not perform or certify the installation using this section of VSB6.
  - For modifications where mass or dimension limits are exceeded, seek modification approval from the relevant heavy vehicle regulator before starting work. The regulator will likely require the installation to comply with this section.
- Added the following requirements to Design requirements for VMLS location
  - Ensure in-cab controls, where fitted, do not interfere with the driver's control of the vehicle.
- Changed the following requirement to a recommendation of Design requirements for VMLS location:
  - For operator safety, install external vehicle mounted controls on the left or rear of the vehicle.

- Added the following requirement to Design requirements for Load distribution requirements:
  - Ensure that adequate front axle loads are maintained to provide effective steering and braking. If this information is not available from the vehicle manufacturer, consult with a qualified engineer or refer to the performance based standard (PBS) standard for steer tyre friction demand.
  - Ensure that when the tailgate loader is extended and at maximum load it does not cause the chassis stress limit to be exceeded.
- Removed the requirement to perform load distribution calculations to assess steering effect.
- Added the following requirement to Design requirements for Lights and markers requirements:
  - If the VMLS or associated components diminish the visibility of any lamp or marker plate, restore compliance, possibly through fitting supplementary lamps or plates.
- Aligned the restraining forces required to be withstood by the installation with the Load Restraint Guide as prepared by the National Transport Commission (NTC) (http://www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/).
- Added the following requirement to Installation requirements for Chassis installation requirements:
  - Apply an appropriate FoS to the stresses calculated for these forces and ensure the factored stresses do not exceed the yield strength of the materials being used.
- Added the following requirement to Installation requirements for Fittings requirements:
  - Ensure all hydraulic VMLS contain burst protection that will prevent movement of any loadbearing hydraulic cylinders as required by AS/NZS 1418.11 in the event of hose rupture or pipe fracture.
- Added the following requirement to Installation requirements for VMLS attachment requirements:
  - Ensure that all bolts are tightened to the manufacturer's recommended torque, or if this is not available, the relevant Australian Standard.
- Added the following requirement to Installation requirements for VMLS attachment requirements - Sub-frame to chassis attachments:
  - Ensure that sub-frames have full continuous contact with the vehicle chassis, where the chassis fastening method inhibits this, ensure suitable alternative methods are used (e.g. install additional strips of material either side of the rivets to allow for contact with the sub-frame).
- Changed the following requirement to a recommendation of Installation requirements for VMLS attachment requirements - Sub-frame to chassis attachments:
  - Fit the sub-frame so that it, along with its attachment to the chassis, does not excessively reduce chassis flexibility.
    - The use of rigid sub-frames may be prohibited by some vehicle manufacturers. Before commencing the installation of a VMLS discuss the installation with the vehicle manufacturer.
- Added the following recommendations to Installation requirements for VMLS attachment requirements - Sub-frame to chassis attachments:
  - If mounting a suitably light VMLS on heavy or reinforced sections, such as a chassis used with a tandem rear axle group, a short sub-frame can be used provided stress calculations for the chassis are performed to ensure requirements are addressed.
  - Ensure protruding weld beads on the sub-frame do not contact the top flange of the chassis when operating.
- Added the following recommendations to Installation requirements for VMLS attachment requirements - VMLS to sub-frame attachment:
  - Ensure cross-members included in the sub-frame meet the requirements of VSB6 Section H — Chassis. Avoid using cross-members made from large sections of rectangular hollow section (RHS) or pipe unless recommended by the VMLS manufacturer
  - Attach the VMLS to the sub-frame in accordance with VSB6 Section H — Chassis so that it imparts forces into the chassis webs and isolates the chassis flange from stress raisers
  - Avoid utilising an attachment method that imparts forces onto the chassis flange
  - Avoid utilising an attachment method that imparts a loading similar to U-bolt attachment. Through the lack of metal spacers between the top and bottom flanges of the chassis. Avoid using this method as it is likely to damage the chassis rail.
  - Where these methods are used, ensure the chassis has reinforcing or spacers added, creating a boxed-in section to eliminate chassis flange bending.
- Clarified the stability and axle loading requirements with the following:
  - If a VMLS needs to comply with the requirements of AS/NZS 1418.11, the stability requirements of AS/NZS 1418.11 take precedence over this section. For all non-AS/NZS 1418 VMLS.
- Added the following recommendations to Installation requirements for Stability and axle loading requirements - Approval of VMLS fitting:
  - For a non-slewing VMLS, test stability only for the positions in which the VMLS is able to be used.
- Expanded requirement to assess stability of all VMLS. Previously this was only required for slewing VMLS
- Added the requirement to Test all VMLS in accordance with the testing requirements of AS/NSZS 1418.11 for installation and stability .
- Removed (from Section Q) detailed guidance on how stability testing is to be conducted.
- Moved example calculation of weight distribution to Section H overview

R2-Wheelchair Loader Installation

- Removed Manufacturing and fitting of an automotive type door from the scope
- Clarified the scope by specifically noting that the following was not covered:
  - fitting of a wheelchair loader resulting in the loader protruding (internally or externally) in a way that is likely to increase the risk of injury to a person.
- Added references AS 1428 *Design for Access and Mobility* as a related standard.
- Added the following requirements to Compliance requirements:
  - If a wheelchair loader is installed so that the non-operating (travel) position is internal to the vehicle, ensure the installation does not result in protrusions inside the cabin that increase the risk of injury to the vehicle occupants.

- If the loader is installed in close proximity to, or directly behind seating positions, focus on preventing or reducing the likelihood of head impact.
- If a wheelchair loader installation results in or requires modifications to parts of the vehicle outside of the scope of this modification code, perform and certify these in accordance with the relevant sections of VSB6.
- Ensure, where fitted, all wheelchair occupant restraint systems are certified in accordance with VSB6 Modification Code K5.

- Added the following requirements to Design requirements for Mass and dimensions requirements:
  - Where an object protrudes from the vehicle but is technically essential, it must be designed, positioned and constructed to reduce the risk of injury to a minimum.
  - If an installation results in a vehicle's dimensions exceeding regulatory limits, do not perform or certify the installation using this section of VSB6 .
  - For modifications where mass or dimension limits are exceeded, seek modification approval from the relevant heavy vehicle regulator before starting work. The regulator will likely require the installation to comply with this section.
  - Ensure that once the wheelchair loader is fitted, the vehicle does not exceed any of the vehicle's ratings including the gross vehicle mass (GVM), axle capacity and suspension capacity.
  - If fitting the wheelchair loader is likely to cause the vehicle to exceed any vehicle ratings, upgrade the vehicle in accordance with VSB6 Section S — Vehicle rating before installing and certifying the wheelchair loader.
- Added the following recommendations to Design requirements for Mass and dimensions requirements:
  - Consider the vehicle's capacity for carrying goods when assessing whether it is likely to exceed any of its ratings.
  - Consult vehicle, body and wheelchair loader manufacturers or suppliers on special mounting requirements before starting modifications in relation to the suitability of the vehicle with the loader type and its capacity or size.
- Added the following requirements to Design requirements for Location of loader:
  - Place all wheelchair loaders:
    - other than platform type, except where the wheelchair loader is fitted exclusively for the use of the vehicle's driver, on the left side or rear of the vehicle.
  - Ensure the vehicle, when fitted with a wheel chair loader, continues to meet the requirements of ADR 44/.. , 58/.. or state or territory passenger transport requirements for emergency exits by assessing the following:
    - wheelchair loader installation does not obscure or obstruct emergency exits, unless the vehicle complies with emergency exit requirements in excess of / in addition to the obstructed exit
    - all other emergency exits remain free of obstructions and can be opened from both inside and outside the vehicle.
- Added the following requirements to Design requirements for Control system:
  - Ensure in-cab controls, where fitted, do not interfere with the driver's control of the vehicle.
- Removed prohibition on the wheelchair passenger on the loader being able to operate the loader, however maintained requirement that the controls be operable by an attendant.
- Incorporated sub-frame to chassis and loader to sub-frame installation requirements and recommendations from section Q.
- Removed the following requirement:
  - Steering Effect - the minimum front axle load, with the vehicle in any load condition and with the loader in its stowed travel position, must not be less than that on the cab-chassis vehicle as supplied by the original vehicle manufacturer. Load distribution calculations are required to ensure that the above requirement is met.
  - The brackets must be attached using Nutserts or equivalent expanding insert devices.
- Added the following requirement to Design requirements for Lights and markers requirements:
  - If the VMLS or associated components diminish the visibility of any lamp or marker plate, restore compliance, possibly through fitting supplementary lamps or plates.
- Added the following requirement to Installation requirements for Attachment to chassis:
  - Ensure the method for installing the wheelchair loader to the body, chassis or sub-frame complies with the vehicle manufacturer's recommendations. Where these are not available, ensure there is sufficient body or chassis reinforcement so that the load moment induced by all dynamic forces imposed during operation is within the body or chassis design limits.
  - Do not exceed the vehicle manufacturer's maximum allowable chassis stress level by the operation of the loader at its nominated rated capacity.
  - If the vehicle manufacturer's maximum allowable stress level is not available, ensure its FoS is not less than three and that it is appropriate for the installation.
  - If installing a hoist or ramp for the disabled is likely to cause a high load, fit anchorage plates to support the loader and attach it to the chassis of the vehicle.
  - If installing a hoist or ramp for the disabled is likely to cause only a low load and is attached to panel steel, attach it using rivet nuts, equivalent expanding inserts or anchorage plates.
  - Apply an appropriate factor of safety to the stresses calculated for these forces and ensure the factored stresses do not exceed the yield strength of the materials being used.
- Aligned the restraining forces required to be withstood by the installation with the Load Restraint Guide as prepared by the National Transport Commission (NTC) (http://www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/).
- Added the following requirement to Installation requirements for Wheelchair loader to chassis attachments:
  - Ensure all installations also comply with the following:
    - The wheelchair loader meets the requirements of the relevant sections of AS/NZS 3856 and AS 1428.
    - Ensure that all bolts are tightened to the manufacturer's recommended torque, or if this is not available, the relevant Australian Standard.

- Ensure the wheelchair loader and all associated components can withstand rated capacity without causing permanent deformation or excessive deflection.
- Added the following requirement to Installation requirements for Sub-frame to chassis attachments:
  - Do not allow sections used for the sub-frame and its attachment to the chassis to excessively reduce chassis flexibility.
  - Do not let any protruding weld beads on the sub-frame to contact the top flange of the chassis when operating.
- Added the following recommendations to Installation requirements for Sub-frame to chassis attachments:
  - Reinforce open section sub-frame rails in the vicinity of their attachments to the chassis.
  - If the ends of the sub-frame finish on the chassis top flange, make the end taper to avoid abrupt changes in section stiffness.
  - Chamfer or provide suitable radius to the underside of the sub-frame end to prevent digging-in to the chassis top flange.
  - Construct the sub-frame so the combined chassis and sub-frame has a FoS of three at the load moment induced by all dynamic forces imposed during operation.
    - Most commercially available channel and rolled section material has a yield limit of 250 MPa.
- Added the following requirement to Installation requirements for Wheelchair loader to sub-frame attachments:
  - Attach the wheelchair loader to the sub-frame/chassis with the mounting bolt layout according to the wheelchair loader manufacturer's technical guidelines.
  - Use a single layout and do not mix or use multiple alternative layouts.
  - Use non-collapsing washers with the fasteners and self-locking nuts, or vibration-proof fasteners, to prevent loosening.
  - Prevent longitudinal and transverse movement between the wheelchair loader and sub-frame by attaching blocks or stops.
- Added the following recommendations to Installation requirements for Wheelchair loader to sub-frame attachments:
  - Ensure cross-members included in the sub-frame comply with the requirements of VSB6 Section H — Chassis.
  - Attach the wheelchair loader to the sub-frame in accordance with VSB6 Section H — Chassis.
  - Ensure the attachment imparts the forces into the chassis webs and isolate the chassis flange from stress raisers.
  - Avoid any attachment of the sub-frame that imparts forces onto the chassis flange.

Section S – Vehicle rating

S-Overview

- Extended the scope of Section S to cover the certification and re-rating of both the ATM and GTM of trailers.
- Removed from scope the ability to certify trailers as B-double compatible as there are no trailer specific requirements for operation in a B-double.
- Removed references to state specific codes S4, S5, S6 and S10.
- Added clear advice specifically mentioning that trailer modifications where the type of trailer is changed are not covered with the following:
  - Although the modification codes in this section apply to the modification of a motor vehicle or trailer unless specifically mentioned, this section does not apply to a trailer that has been modified to change the trailer's basic type, e.g. semitrailer to dog trailer, pig trailer to dog trailer, semitrailer to dolly, etc. Such trailers are deemed to be newly manufactured and must be certified as a new vehicle through the Road Vehicle Certification System. For more information about the certification of new vehicles, please refer to the Department of Infrastructure and Regional Development.
- Clarified that the conversion of a semitrailer to a B-double semitrailer is not considered change of the type of trailer for this part with the inclusion of the following note:
  - Conversion of a semitrailer to a B-double lead trailer is not a change of basic trailer type and must be done in accordance with the applicable sections of VSB6 including Section G — Brakes and Section P — Tow couplings.
- Clarified the intensions of each modification code in Section S.
- Outlined what is considered to be acceptable evidence of manufacturer's specifications.

S1-GVM / GCM re-rating

- Extended the scope of permissible modifications by specifically noting that the following is covered:
  - administrative re-rating of 10,000 lb vehicles
  - GVM/GCM reductions without modification.
- Changed the scope of permissible modifications by removing following:
  - Gross Vehicle Mass (GVM) rating reductions (with or without modifications) undertaken for the purpose of reducing the statutory charges (e.g. registration fees, toll charges etc) applying to the vehicle at the vehicle manufacturer's original GVM.
- Added Front underrun protection and Road speed limiter to list of related standards.
- Added the following to Compliance requirements:
  - When a vehicle's GVM is reduced, the braking system's performance is also affected; replacement or adjustment of any load proportioning valves may be required.
- Added the following requirements to Compliance requirements:
  - Re-rate a vehicle **only** if it conforms to:
    - a vehicle specification for which an accredited S2 (GVM) or S3 (GCM) AVE has issued a design certificate and checklist; or
    - the design specification of an alternative vehicle produced by the vehicle manufacturer.
  - Ensure the vehicle maintains a net carry capacity that is practical and reflects its intended use. Ensure that calculations used to establish the revised GVM consider the following:
    - tare mass of the vehicle
    - intended load
    - mass of occupants (driver/passengers)
    - any additional equipment carried (i.e. toolboxes).
  - Do not reduce a GVM rating simply in order to reduce statutory charges (registration fees, toll charges etc.)

that apply to the vehicle at the manufacturer's original GVM, unless supported by:
    - a design specification certifying the alternative rating issued by the vehicle manufacturer; or
    - a design certificate issued by an accredited S2 (GVM) or S3 (GCM) AVE.
  - Ensure the modification plate contains the changed GVM/GCM rating.
- Clarified the requirement for speed limiting is 100km/h in accordance with the requirements of ADR 65/.. .
- Added the following requirements to Design requirements for Speed limiter requirements:
  - Limit the maximum speed of the vehicle to 100 km/h in accordance with the requirements of ADR 65/.. .
  - If the speed limiter is not certified by the manufacturer to comply with ADR 65/.. , ensure the vehicle had a speed limiter installed and certify in accordance with VSB6 Modification Code A5.
- Added the following requirements to Design requirements for Tyre and wheel rims requirements:
  - If tyre or wheel changes are performed, they must be conducted in accordance with VSB6 Section E — Front axle steering wheels and tyres.
- Added the following requirements to Design requirements for Brakes requirements:
  - Before any change in GVM can be certified, if the brake system is modified, ensure that the modification is performed and certified in accordance with VSB6 Section G — Brakes.
  - Before a reduction in GVM can be certified, ensure that, if applicable, the brake system is modified to meet the specifications of the:
    - vehicle manufacturer's design specification; or
    - the design certificate issue by an accredited S2 (GVM) AVE.
- Added the following requirements to Design requirements for Driveline requirements - Gradeability and startability:
  - Ensure the vehicle's gradeability at the revised GVM/GCM is at least 23%.
  - Ensure the vehicle's startability at the revised GVM/GCM is at least 13%.
- Added the following recommendations to Design requirements for Driveline requirements - Gradeability and startability:
  - Whilst a gradeability of 23% and startability of 13% is mandatory, where a vehicle is intended to operate on increased grades, it is recommended to ensure the vehicle's gradeability and startability is appropriate for its revised GVM/GCM.
- Added the following requirements to Design requirements for Reduction in GVM — without modification:
  - Where a motor vehicle's GVM is to be reduced without physical modification that does not result in a change of ADR category, ensure the re-rating is certified under this modification code.
  - Where the re-rating results in a change of ADR category, ensure the modification is performed in accordance with a design certificate issued by an appropriately qualified and accredited S2 AVE.
- Added the following to cover the Administrative re-rating of 10,000 lb vehicles:
  - If a vehicle has originated from the United States market and is rated at 10,000 lbs (4536 kg) GVM, the GVM may be re-rated to 4490 kg without modification. This re-rating of GVM changes the vehicle category from NB2 to NB1. As a modification that affects ADR certification, re-rating of a 10,000 lb vehicle must not be performed before a vehicle has been supplied to the market.
  - Supply to the market is defined under the Commonwealth Motor Vehicle Standards Act 1989.
- Added the following requirements to Design requirements for Administrative re-rating of 10,000 lb vehicles:
  - The vehicle must meet all applicable ADRs for the new (NB1) category, including but not limited to braking performance.
  - If physical modifications are required to support the revised re-rating, including but not limited to changes to align with the manufacturer's specifications, the modification must be performed and certified in accordance with the relevant sections of VSB6.

S2-GVM re-rating (Design)

- Changed the scope of S2 to cover only the issuing of issue a design certification and checklist that allows an accredited S1 AVE to certify the permissible GVM rating of heavy motor vehicles.
- Removed reference to motorhomes from the scope of S2.
- Added that the design certificate can be based on vehicle specifications:
  - obtained directly from the vehicle by the accredited S2 AVE
  - provided to the accredited S2 AVE, by the owner, modifier, accredited S1 AVE or otherwise.
- Clarified the scope of permissible modifications by specifically noting that the following is covered:
  - the issuing of a design certificate and checklist for use by an accredited S1 AVE to inspect and re-rate the GVM of a motor vehicle. The vehicle itself may or may not have been inspected by the accredited S2 AVE.
  - the issuing of a certificate and checklist for use by an accredited S1 AVE to permit the GVM rating reductions where the maximum necessary and likely laden vehicle mass can be established to be lower than the vehicle manufacturer's original GVM.
- Clarified the scope of permissible modifications by specifically noting that the following is not covered:
  - the issuing of a design certificate that allows for GVM rating changes (increase or reduction) that would cause the vehicle to be non-compliant with any applicable ADRs, Australian Standards, acts and regulations at the changed rating.
- Added Front underrun protection and Road speed limiter to list of related standards.
- Added the following to Compliance requirements:
  - Issue a design certificate which:
    - clearly identifies whether it refers to a specific vehicle or to a range of vehicles:
      - specific vehicle
      - type or range of vehicles
    - includes a checklist of all relevant specifications of the vehicle, such as chassis material, engine, suspension and driveline components etc., for the accredited S1 AVE to verify that the vehicle meets the requirements of the S2 design certificate
    - identify the source of any specifications or ratings.
- Added the following to Changes in GVM:
  - When a vehicle's GVM is reduced, the braking system's performance is also affected; replacement or adjustment of any load proportioning valves may be required.

- Added the following requirements to Design requirements for Speed limiter requirements:
  - Limit the maximum speed of the vehicle to 100 km/h in accordance with the requirements of ADR 65/.. .
  - If the speed limiter is not certified by the manufacturer to comply with ADR 65/.. , ensure the vehicle had a speed limiter installed and certify in accordance with VSB6 Modification Code A5.
- Added the following requirements to Design requirements for Tyre and wheel rims requirements:
  - If tyre or wheel changes are performed, they must be conducted in accordance with VSB6 Section E — Front axle steering wheels and tyres.
- Added the following requirements to Design requirements for Brakes requirements:
  - Before any change in GVM can be certified, if the brake system is modified, ensure that the modification is performed and certified in accordance with VSB6 Section G — Brakes.
- Added the following requirements to the Design requirements - Driveline requirements for both Gradeability and Startability:
  - Ensure the vehicle's gradeability at the revised GVM/GCM is at least 23%.
  - Ensure the vehicle's startability at the revised GVM/GCM is at least 13%.
  - Formulas for calculating gradeability and startability
- Added the following recommendations Design requirements - Driveline requirements for both Gradeability and startability:
  - Whilst a gradeability of 23% and startability of 13% is mandatory, where a vehicle is intended to operate on increased grades, it is recommended to ensure the vehicle's gradeability and startability is appropriate for its revised GVM/GCM.
- Added the following requirements to Design requirements for Motor vehicle rating reduction - Motorhomes:
  - Where the vehicle is converted for use as a motorhome, reduce the GVM rating to its 'maximum loaded vehicle mass' (as defined in the Australian Design Rule – Definitions and Vehicle Categories). Ensure evidence that demonstrates the vehicle's weight, (i.e. a weighbridge ticket) is obtained with the vehicle loaded and adjusted for the following:
    - all supplied equipment, such as cooking equipment and utensils, refrigerator, cooling/heating systems, bedding, toilet, shower, TV/entertainment systems, LPG or NG bottle(s), etc.
    - an additional mass equivalent to 13.6 kg for each seating position (i.e. for luggage / personal items)
    - a mass equivalent to 60 kg for each of the first two sleeping berths plus 20 kg for each additional sleeping berth.
- Added the following recommendations to Design requirements for Motor vehicle rating reduction - Motorhomes:
  - The reduced GVM should also include the following items:
    - If fitted, a bicycle or motorcycle rack loaded to its manufacturer's capacity.
    - A reasonable weight for unexpected items (which should not exceed 500 kg).

S3-GCM re-rating (Design)

- Changed the scope of S3 to cover only the issuing of issue a design certification and checklist that allows an accredited S1 AVE to certify the permissible GCM rating of modified vehicles.
- Added the following to Compliance requirements:
  - Issue a design certificate which:
    - clearly identifies whether it refers to a specific vehicle or to a range of vehicles:
      - specific vehicle
      - type or range of vehicles
    - includes a checklist of all relevant specifications of the vehicle, such as chassis material, engine, suspension and driveline components etc., for the accredited S1 AVE to verify that the vehicle meets the requirements of the S3 design certificate
    - identify the source of any specifications or ratings.
- The following has been added to cover Driveline change in GCM:
  - The engine and driveline are also critical components in GCM rating. When a significant increase in GCM is required, the chassis may require modification to ensure an adequate strength rating is achieved.
- Added the following requirements to Design requirements for Driveline requirements - startability:
  - Ensure the vehicle's startability at the revised GVM/GCM is at least 13%.
  - Formulas for calculating startability
- Removed the option for physical testing of gradeability.
- Removed the following statement as it only applies to multi-combination configurations which are covered by S8 and S9:
  - Where a GCM increase will permit a trailer with a greater number of axles to be towed or permit multiple trailers, the capacity of the air compressor or other trailer brake energy supply must be checked to ensure that it is adequate to supply the additional trailer brake requirements.

S7-ATM / GTM re-rating

- Extended the scope of to cover the certification and re-rating of both the ATM and GTM of trailers.
- Extended the scope of permissible modifications by specifically noting that the following is covered:
  - ATM/GTM rating changes for trailers modified to conform to specifications for a trailer at the revised ATM/GTM rating assigned by the trailer's manufacturer, provided the AVE has written evidence of the specifications
  - ATM/GTM rating changes for a trailer inspected and confirmed to a design certified by an accredited S12 AVE.
- Removed option for trailer with no rating to be rated based on the rating of a similar trailer.
- Clarified that compliance with ADR 38/.. transmission times and lengths is a requirement.

S8-Motor vehicle road train rating

- Changed the scope to cover road train GCM changes of motor vehicles certified for use in road trains.
- Changed the scope to allow road train GCM changes without upgrades where the rating is still within the component manufacturer's ratings.
- Clarified the scope of permissible modifications by specifically noting the types not covered:
  - B-double GCM re-rating (see VSB6 Modification Code S9).
  - GCM re-rating of a motor vehicle for use in a single trailer configuration (see VSB6 modification codes S1 and S3).

- Added specific requirement that where a vehicle is road train rated that the modification plate show the words 'ROAD TRAIN'.
- Added the following recommendations to Compliance requirements:
  - Assign a maximum road train GCM and ensure the certification verifies that the motor vehicle complies with all the requirements for road train operation.
- Added the following recommendations to Design requirements for Speed limiting:
  - Ensure the following types of vehicles are fitted with a road speed limiter that complies with ADR 65/.. :
    - a prime mover with a GVM of more than 15 tonnes built from 1 January 1988; or
    - an NC category vehicle built from 1 January 1991.
- Changed specific requirement for chassis rating letter to be from a registered professional engineer, to an accredited S8 AVE.
- Removed option for motor vehicle to be re-rated based on the rating of a motor vehicle with only an identical chassis.
- Changed the recommendation that a road train motor vehicle have a specific gradeability to a requirement.
- Changed the minimum startability to 8% from 10%.
- Clarified that startability of 8% is a requirement.
- Added Formula for calculating startability.

S9-Prime mover B-double rating

- Removed from scope the ability to certify trailers as B-double compatible as there are trailer specific requirements for operation in a B-double.
- Extended the scope of permissible modifications by specifically adding the following types of modifications covered:
  - B-double GCM rating changes of prime movers certified for use in B-double combinations.
- Restricted the scope of permissible modifications by specifically adding the following types of modifications not covered:
  - B-double GCM changes on prime movers that do not have ABS
  - certification of prime movers without ABS for use in B-double combinations.
- Changed the scope to allow B-double GCM changes without upgrades where the rating is still within the component manufacturer's ratings.
- Clarified the scope of permissible modifications by specifically adding the following types of modifications not covered:
  - GCM re-rating for a road train configuration (see VSB6 Modification Code S8).
- Added the following recommendations to Compliance requirements:
  - Assign a maximum B-double GCM and ensure the certification verifies that the motor vehicle complies with all the requirements for B-double operation.
- Added the following recommendations to Design requirements for Speed limiting:
  - Ensure the following types of vehicles are fitted with a road speed limiter that complies with ADR 65/.. :
    - a prime mover with a GVM of more than 15 tonnes built from 1 January 1988; or
    - an NC category vehicle built from 1 January 1991.
  - Where a road speed limiter is fitted to a vehicle as part of certification as a road train vehicle, ensure that the modification is performed and certified in accordance with VSB6 Modification Code A5.
- Added the following recommendations to Design requirements for Speed limiter:
  - Ensure the following types of vehicles are fitted with a road speed limiter that complies with ADR 65/.. :
    - a prime mover with a GVM of more than 15 tonnes built from 1 January 1988; or
    - an NC category vehicle built from 1 January 1991.
- Added the following recommendations to Design requirements for Chassis and driveline requirements - Chassis requirements:
  - Ensure the chassis has adequate strength for the relevant B-double GCM (see VSB6 Section H — Chassis).
  - Provide evidence of this suitability using at least one of these:
    - written evidence from the vehicle manufacturer stating that the chassis is adequate for the proposed B-double GCM rating
    - a certification letter from an accredited S9 AVE confirming the adequacy of the chassis design for the proposed B-double GCM.
  - Ensure that the towing coupling and its attachment is assessed and is adequate at the B-double GCM rating (see VSB6 Section P — Tow couplings).
- Added the following requirements to Design requirements for Chassis and driveline requirements - Driveline requirements – Gradeability:
  - Ensure the vehicle's gradeability at the B-double GCM is at least 12%. The theoretical figure of 12% indicates acceptable performance under B-double operating conditions.
  - If a vehicle's B-double GCM is based on a manufacturer's specification, the gradeability requirements below are still applicable.
- Updated the startability requirement for B-double prime movers to 15% to align with B-double access route assessment guidelines.
- Added the following requirements to Design requirements for Chassis and driveline requirements - Driveline requirements – Startability:
  - Establish startability via the motor vehicle manufacturer's computer simulation or, when this is not available, by calculation using the formula:
- Added Formula for calculating startability.
- Removed recommendation that where a prime mover previously approved for use in B-Double that it is not required to be retro-fitted with anti-lock brakes.
- Added the following requirements to Design requirements for Braking:
  - Ensure the B-double prime mover complies with relevant requirements of ADR 35/.. and that if manufactured after 1 July 1991 it also complies with the requirements of ADR 64/.. .
  - To prevent incorrect coupling of brake lines, ensure all couplings are non-interchangeable (polarised) in accordance with the requirements of ADR 35/.. and all fittings have a clear bore (no restrictor or non-return valves).
  - Test the brake application and release times at the trailer control line coupling, as part of a B-double combination or as an individual vehicle in accordance with '6. Testing requirements' of this modification code.

- Added the following requirements to Design requirements for Braking - Existing vehicles:
  - A prime mover, including those previously approved for use in B-double, is required to be retro-fitted with anti-lock brakes if not previously fitted, see anti-lock braking system subsection in VSB6 Section G — Brakes.
  - If the braking system is modified, perform and certify in accordance with VSB6 Section G— Brakes.
- Moved brake system specific requirements into section G.
- Added the following requirements to Design requirements for Fifth wheels:
  - Ensure that the fifth wheel installation is either by the vehicle manufacturer or performed and certified in accordance with VSB6 Modification Code P2.
  - Do not use non-restricted double oscillating type fifth wheels.
- Removed specific statement that all axle groups in a B-Double combination must be "conforming" axle groups and must meet the current requirements for individual State jurisdictions.
- Removed references to Spray Suppression.
- Moved requirements and recommendations for sliding axle assemblies to Modification Code F2.
- Removed references to “Long vehicle” signs.

S11-Road train trailer rating

- Clarified the scope of permissible modifications by specifically noting the types covered:
  - re-rating the ATM/GTM of a road train trailer that has been modified in accordance with the manufacturer’s specification.
- Clarified the scope of permissible modifications by specifically noting the types not covered:
  - road train rating of trailers already certified by the manufacturer as complying with ADR 38/.. and ADR 63/.. with the words road train trailer marked on the vehicle plate as required by ADR 61/.. which have not been modified.
  - rating of trailers used in a combination with a gross combination mass exceeding 125 tonnes (this will require a specific modification application to your relevant heavy vehicle regulator).
- Clarified naming convention as well as descriptions of typical road train combinations.
- Removed guidance on access for road trains and replaces with:
  - Always check local regulations for requirements to access the road network.
- Removed the requirements for electrical wiring duplicated from ADR 63/.. and replaced with the following requirements in Design requirements for Electrical wiring requirements:
  - Ensure the electrical wiring and connectors conform to ADR 63/..
  - Ensure that electrical wiring and connectors also conform to ADR 42/.. , which requires electrical connector configuration, wiring support and protection.
- Removed guidance on brake system modification and added the following requirements in Design requirements for Brake system requirements:
  - Ensure where the braking system is modified, it is performed and certified in accordance with VSB6 Section G — Brakes.
  - Ensure that the application and release times for brake signal are tested, particularly if a partially new control system sub-assembly is used.
  - Ensure when designing a trailer for use in a road train the brake timing performance as per ‘7. Testing requirements’ is considered.
- Added the following requirements in Testing requirements for Braking tests - Brake system calculated performance:
  - Where the braking system of the trailer is modified, the modifications must be performed and certified in accordance with VSB6 Section G — Brakes.
- Removed guidance on Road Train signs.

S12-ATM / GTM re-rating (Design)

- Extended the scope of to cover the certification of both the ATM and GTM of trailers.
- Changed the scope of S12 to cover only the issuing of issue a design certification and checklist that allows an accredited S7 AVE to certify the permissible ATM/GTM rating of a trailer.
- Clarified the scope of permissible modifications by specifically noting that the following is covered:
  - the issuing of a design certificate and checklist for use by an accredited S7 AVE to inspect and re-rate the ATM/GTM of a trailer. The trailer itself may not have been inspected by the accredited S12 AVE.
- Clarified the scope of permissible modifications by specifically noting that the following is not covered:
  - the issuing of a design certificate that allows ratings that would cause any component of the vehicle to be loaded in excess of that component manufacturer's rating
- Added the following to Compliance requirements:
  - Issue a design certificate which:
    - clearly identifies whether it refers to a specific vehicle or to a range of vehicles:
      - specific vehicle
      - type or range of vehicles
    - includes a checklist of all relevant specifications of the trailer such as chassis material, suspension and braking system components etc. for the accredited S7 AVE to verify that the trailer meets the requirements of the S12 design certificate
    - identify the source of any specifications or ratings.
- Added the following requirements to Design requirements for Tyres and wheel rims requirements:
  - Ensure if the tyre rolling diameter is changed that the trailer brake system is re-certified in accordance with VSB6 Section G — Brakes.
- Added the following requirements to Design requirements for Braking system requirements:
  - Where the braking system of the trailer is modified, the modifications must be performed and certified in accordance with VSB6 Section G — Brakes.
- Changed the following recommendations to requirements of Design requirements for Braking system requirements - Brake control system:
  - Check the actual installed lengths of piping against these specifications if the brake system response and release times are not tested by the officer approving the ATM rating.

Section T – Tow trucks

T-Overview

- Updated the Australian Standard for tow trucks from AS 1418.20 to AS 5400 .

T1-Tow Trucks (Construction)

- Clarified that the operator of a T1 certified vehicle is to be issued with a copy of the T2 design.

T2-Tow Trucks (Design)

- Clarified that certified by the component manufacturer means certified as compliant with the relevant Australian Standards.

Minor post-publication changes

Published 1 September 2017

Following publication of VSB6 Version 3 in July 2017, the NHVR has made a small number of changes to address issues that were identified. These changes were minor in nature and do not increase the stringency of the standard.

G6 - Fitting of air operated accessories

- Changed the speed limit for additional methods of brake application to:
  - For truck or trailer mounted attenuators travelling in excess of 45km/h
  - For all other vehicles travelling in excess of 10km/h in the forward direction only.

J - Overview

- Updated Figure 7.

J3 - Fitting of roll-over or falling object protection system

- Added note that vehicle manufacturer's guidelines take precedence over VSB6.
- Clarified that attaching a ROPS/FOPS by welding is only acceptable if allowed by the vehicle manufacturer.
- Changed the requirement that ROPS/FOPS meet specific standards to a recommendation that it is fit for purpose.
- Clarified that the stress and fatigue calculations are of the chassis when in use rather than of the ROPs/FOPS
- Expanded guidance on load bearing transition to also cover mounting plates. Including adding a diagram.
- Changed the requirement to use bolts no bigger than 19mm to a recommendation.
- Expanded options for compliance for load bearing transition of stress into the chassis.
- Clarified what the ROPS/FOPS load moment is.

Section H

- Updated images.

P2-Fifth wheel and kingpin installation

- Reclassified recommendation regarding length of the attachment angle (or fish plate overall spacing) to a requirement in accordance with the ADR requirements.
- Reclassified recommendation regarding clearance between the base plate or sub-frame and chassis flange to a requirement in accordance with the ADR requirements.

R1-Installation of vehicle mounted lifting systems

- Compliance Requirements:
  - Clarified that VMLS certification is to the relevant Australian Standard (as applicable) and by either a professional engineer or the VMLS manufacturer.
- Design Requirements - VMLS location
  - Clarified that the requirement for installation to be at the rear or left side of the vehicle applies to all non-slewing platform types of VMLS.
- Installation requirements:
  - Clarified that blocks and stops are examples of ways to prevent movement between the chassis and loader.
- Testing requirements:
  - Expanded the testing requirements to cover all relevant sections of AS/NZS 1418.
- Checklist:
  - Updated mounting question 4 to allow manufacturer's ratings to be used.

R2- Wheelchair loader installation

- Installation requirements:
  - Clarified that blocks and stops are examples of ways to prevent movement between the chassis and loader.

Published 29 September 2017

E3-Fitting of non-standard front wheel components

- Changed definition of non-standard rims and tyres to be either of the listed options.

J3 - Fitting of roll-over or falling object protection system

- Changed the requirement for tipper bodies to comply with the requirements of AS 1418.8 to be applied to modifications certified on or after 1 April 2018.
- Added recommendation that tipper bodies fitted to motor vehicles and trailers prior to 1 April 2018 comply with the all relevant requirements of AS1418.8.
- Updated J1 Checklist – Body mounting to reflect the above changes.

VSB6 Version 3.1 Release

Published 1 February 2019

Following publication of VSB6 Version 3.0 in July 2017, the NHVR has made some significant changes to the document which resulted in version 3.1 being released in February 2019.

Minor VSB6 Version 3.1 changes

Published 1 February 2019

Following small changes to address issues that were identified in VSB6 version 3.0 have been included in VSB6 version 3.1. These changes were minor in nature and do not increase the stringency of the standard.

A1-Fitting of non-standard front wheel components

- Changed "conversion from petrol engine to diesel and vice versa" to "conversion of engine's fuel type" to better reflect what is permitted under the code.
- Included items under the checklist to allow AVEs to ensure any alternative fuel system meets the relevant Australian Standards and energy regulators requirements.

M1 – Fuel system alterations

- Included a note to ensure the AVE is aware that the energy regulator in their jurisdiction regulates the requirements of alternative fuel installations, modifications and removals.
- Included items under the checklist to allow AVEs to ensure any alternative fuel system meets the relevant Australian Standards and energy regulators requirements.

Major VSB6 Version 3.1 changes

Published 1 February 2019

VSB6 Version 3.1 implemented some major changes such as new modification codes and testing methods. These changes are detailed below.

Section A - Engines

A1-Engine substitution to heavy motor vehicles

- Included the new NHVR simplified emission testing procedure as an option to demonstrate emission standards continue to meet the intent of the ADRs.

Section D – Rear Axles

D3-Fitting of non-standard front wheel components

- New code which covers the fitting of non-standard rear wheels to motor vehicles and trailers, i.e. rims or tyres.
- Scope of modifications covered:
  - fitting of alternative front axle assembly
  - fitting of additional front axle on load sharing or non-load sharing suspension
  - fitting of suspension brackets to front axle housing, providing that welding and installation is in accordance with the axle manufacturer's recommendation.
- Modifications specifically not covered:
  - fitting of axle assemblies that are not compatible with the original vehicle's componentry
  - installation of suspension (including for the additional front axle, see VSB6 Modification Code F1)
  - modifications to axle housings other than those allowed by the axle manufacturer (for fitting of suspension brackets or otherwise)
  - welding or alterations to axle beam or steering components
  - fitting of alternative rims and tyres to the rear axles.