



Section E

Front Axle Steering Wheels & Tyres

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Section E — Overview

1. Description

This section of Vehicle Standards Bulletin 6 (VSB6) relates to replacement of front axle assemblies, alterations to steering systems and fitting of non-standard replacement wheel rims and tyres to the front axle of heavy vehicles.

This section consists of the following modification codes:

E1 Front axle installation

- 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.

E2 Steering alteration

- fitting of alternative steering boxes
- fitting of power steering systems
- fitting of dual control systems, e.g., street sweepers
- alteration of existing controls for modified cab configurations, e.g., island cabs
- fitting of tandem steering axle control systems
- conversions of left to right hand drive.

E3 Fitting of non-standard front wheel components

- fitting of non-standard front wheels, i.e., rims or tyres.

2. Related Australian Design Rules

The Australian Design Rules (ADRs) relevant to this section include:

ADR no.	Title
10/..	Steering Column
24/..	Tyre and Rim Selection
35/..	Commercial Vehicle Brake Systems
42/..	General Safety Requirements
84/..	Front Underrun Protection
90/..	Steering System
95/..	Installation of Tyres
96/..	Commercial Vehicle Tyres

3. Record keeping

The person responsible for certifying the modification should:

- collate complete records, including drawings, calculations, test results and copies of the appropriate issue of Australian Standards and ADRs
- retain the records for a minimum of seven years after commissioning of the modified vehicle
- make the records available upon request for inspection by officers of the relevant federal, state or territory authority or heavy vehicle regulator.

Reports and checklists

The person responsible for certifying the modification must complete and record the following reports and checklists as applicable:

E1 Checklist	Front axle installation
E2 Checklist	Steering alteration
E2 Modification report	Steering alteration
E3 Checklist	Fitting of non-standard front wheel components

4. Common steering linkage names

Figure 1 shows some of the components that are unique to steering systems.

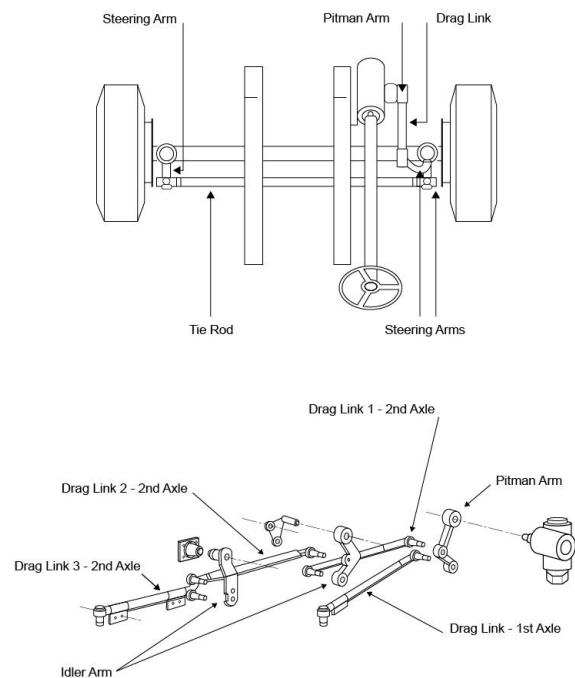


Figure 1: Front axle and steering

5. Design requirements

Advanced braking systems

Advanced braking systems are an important safety feature fitted to many new vehicles.

Advanced braking systems are programmed by the vehicle manufacturer and are specific to the vehicle to which they are fitted. Changes made to the vehicle, such as engine, tyre size, steering control, suspension characteristics, vehicle mass and its distribution, may impact the performance of the advanced braking system.

Exercise extra caution when modifying vehicles fitted with advanced braking systems. Electric braking systems may be known as:

- electronic stability control (ESC)
- electronic stability program (ESP)
- vehicle stability control (VSC)
- dynamic stability control (DSC)
- vehicle stability assist (VSA)
- roll stability control (RSC)
- roll control system (RCS)
- electronic braking system (EBS)
- trailer electronic braking system (TEBS).

- 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 approved vehicle examiner (AVE) consult with the vehicle manufacturer to determine the impact on the system.

Modification Code E1 — Front axle installation

1. Scope

Modifications covered under this code:

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.

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.

2. Related standards

Modified vehicles must comply with all ADRs, Australian Standards, acts and regulations. Below are some but not all of the areas that may be affected by the modifications in this code and require certification, testing or evidence to demonstrate compliance.

The certifier must ensure that the modified vehicle continues to comply with all related ADRs.

This...	Must comply with...
Replace front axles	VSB6 Section E — Front axle steering wheels and tyres
Maximum vehicle width	2.5 m for normal complying vehicles (ADR 43/..)
Brakes	VSB6 Modification Code G4
Re-rating of GVM/GCM	VSB6 modification codes S1 and S2
Turning circle	Maximum 25 m, ADR 43/..
Steering	VSB6 Modification Code E2
Suspension	VSB6 Modification Code F1
Front underrun protection	ADR84/..

3. Certification procedure

The certification procedure for this modification code is as follows:

1. Modifier	Determine if the modification is within manufacturer specifications. <ul style="list-style-type: none"> If yes, the modification will need to be done in accordance with manufacturer specifications. If no, the modification will need to be done in accordance with this modification code.
2. Modifier	Consult with an accredited E1 AVE for guidance on how to perform the modification.
3. Modifier	Perform modification in accordance with AVE advice and this code.

4. Modifier	Organise approval inspection by an accredited E1 AVE.
5. E1 AVE	Perform inspection, complete E1 checklist and determine if compliance has been achieved. <ul style="list-style-type: none"> If yes, proceed to step 6. If no, do not proceed, advise modifier rework is required to ensure compliance. Return to step 2.
6. E1 AVE	Issue modification certificate, affix modification plate, and submit paperwork as required by the relevant AVE registration scheme.

AVEs must be satisfied that vehicle modification requirements are being met. It is advised that before modifications are carried out they are discussed with the certifying AVE.

4. Compliance requirements

Required:

- If modifications affect areas of the vehicle covered by ADRs, demonstrate compliance with ADRs appropriately.
- 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.

Critical components

- If critical components are modified, obtain details of material composition and heat treatment from the component manufacturer, and ensure the strength and durability of the modified components are not reduced.
- Perform appropriate testing to ensure that no degradation of component or assembly strength has occurred.
- If modifications affect the loading of the components, perform a stress analysis to determine if the factor of safety is not less than that provided by the original manufacturer for the critically stressed parts of the assembly.
- Ensure all replacement components are rated suitably for the vehicle (see VSB6 Section S — Vehicle rating).
- If modifying a vehicle, try to keep it as far as possible within the original manufacturer's specifications and adhere to the recommendations of manufacturers of components. If no such recommendations exist, use the original equipment manufacturer's options where possible.

System attachments

- For axle system attachments, use threaded fastenings (unless supplied or specified by the sub-assembly manufacturer) equivalent to SAE Class 8 or ISO Grade 10.9 (see Australian Standard AS 1110) and assemble these using vehicle or component manufacturer's recommended tightening torques and locking methods.

Standard parts

- Ensure all standard parts such as splines, tapers and keyways conform to the published standards, and mating parts to the corresponding matching standards.

Suspension

If altering the suspension or steering, follow the manufacturer's recommendations as first priority or the appropriate sections of VSB6.

5. Design requirements

Axle replacement

Required:

If a front axle is being replaced, ensure the:

- replacement axle has a mass rating suitable for the mass ratings of the vehicle
- spring/airbag spacing on the replacement axle is compatible with the spring/airbag mounting on the chassis.

Axle substitution

Recommended:

- If substituting an axle, transpose the existing brakes to the replacement axle if the brakes are suitable for the required vehicle mass rating.

Additional axle

Required:

- If using different brakes or installing an additional axle, adhere to VSB6 Section G — Brakes.

6. Installation requirements

Required:

- Install axles so that the caster angle is within limits specified by the axle/vehicle manufacturer.
- If the camber angle requires adjustment, change the angle in accordance with AS/NZS 4737 I-Beam Steer Axle Camber Adjustment.
- If a change in axle ratio is performed on a vehicle with a driven front axle, ensure that a suitable ratio is selected for road speed, startability and gradeability (see VSB6 Modification Code B1).
- Ensure the manufacturer's ratings for the end fittings of the ball joints, plain bearings and idler arm pivots do not exceed the loads and angular movement requirements encountered in the modified vehicle.
- Provide guards to prevent fouling with moving components and potential injury to vehicle occupants.

Welding axles

Required:

- 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.
- Ensure all welding on an axle is performed by a qualified welder in accordance with the axle manufacturer's welding instructions.
- Do not perform welding or other re-work on an I-beam axle unless specifically permitted by the axle manufacturer.
- Perform all modifications in accordance with good engineering practice.

Recommended:

- After replacing front axles check and adjust the wheel alignment to the appropriate specification.
- Take into consideration that changes to the front axle, steering, wheels, or tyres are likely to induce increased bump steer and avoid these modifications wherever possible.
- After modifications to the front axle, steering or front wheels, check the components under simulation for adequate clearance under full travel of the steering and the front suspension systems.

Hoses, steel tubing and reservoirs

Required:

- Ensure hoses, steel tubing and reservoirs are in accordance with the hydraulic standard, size, flow, and pressure rating recommended by the manufacturer of the steering box or power cylinder and are suitably located and secured for ease of maintenance and top-up.
- Ensure the hose routing is clear from heat sources and any moving parts.

E1 Checklist — Front axle installation (example)

E1 Checklist — Front axle installation

📌 This checklist is for use by approved vehicle examiners (AVEs) to assess front axle installations.

Vehicle and modifier details

Vehicle make:	Vehicle model:	Month and year of manufacture:
VIN (if applicable):	Vehicle chassis no. (if applicable):	Vehicle modifier (company name):

Axle details

Front axle make and model:	Axle rating (kg):	Serial no.:

Advanced braking systems

Braking systems	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Is the advanced braking system (where fitted) un-affected or re-certified after the vehicle modification?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Modification details

Modification criteria	Check Yes, No as applicable:	Yes	No
1 Has the modification been performed in accordance with the manufacturer's guidelines?		<input type="checkbox"/>	<input type="checkbox"/>

Installation details

Axles	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Do the replacement or additional axles have a mass rating suitable for the mass rating of the vehicle?		<input type="checkbox"/>	<input type="checkbox"/>	
2 Do the replacement or additional axles have spring/airbag spacing compatible with the spring mountings on the chassis?		<input type="checkbox"/>	<input type="checkbox"/>	
3 Is all welding on the axle housing performed in accordance with the axle manufacturer's recommendations?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Is the axle installed within the axle/vehicle manufacturer's recommended caster angle limits?		<input type="checkbox"/>	<input type="checkbox"/>	
5 Does the width of the axle assembly and turning circle comply with the relevant Australian Design Rules (ADRs)?		<input type="checkbox"/>	<input type="checkbox"/>	
6 Has any change in ride height resulted in continued compliance with ADR 84/.. requirements?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suspension	Check Yes, No, N/A as applicable:	Yes	No	N/A
7 Have all changes to the suspension been completed in accordance with VSB6 Section F — Suspension?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tail shafts	Check Yes, No, N/A as applicable:	Yes	No	N/A
8 For vehicles with front driven axles, are all tail shaft alterations performed and certified in accordance with VSB6 Section C — Tail shafts?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brakes	Check Yes, No, N/A as applicable:	Yes	No	N/A
9 Are any changes to the brakes performed and certified in accordance with VSB6 Section G — Brakes?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steering	Check Yes, No, N/A as applicable:	Yes	No	N/A
10 Does the steering system have adequate clearance throughout the operating range and suspension travel?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Compliance

Modification	Check Yes, No as applicable:	Yes	No
1 Does this modification meet all the requirements of the manufacturer's guidelines / Modification Code E1?		<input type="checkbox"/>	<input type="checkbox"/>
2 Is the quality of the work to an accepted industry standard?		<input type="checkbox"/>	<input type="checkbox"/>
3 Does the vehicle continue to comply with ADRs and heavy vehicle standards regulations affected by the modification?		<input type="checkbox"/>	<input type="checkbox"/>

Vehicle chassis no./VIN:	Date:	Signed:

E1 Checklist — Front axle installation

➤ This checklist is for use by approved vehicle examiners (AVEs) to assess front axle installations.

Authorisation

Other than modification criteria, if the answer to any relevant question is NO the modification is not acceptable.

Comments:			
Examined by:	Company (if applicable):		AVE no.:
Signed:	Modification certificate no.:	Modification plate no.:	Date:

Example Only

Vehicle chassis no./VIN:	Date:	Signed:
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Modification Code E2 —Steering alteration

1. Scope

Modifications covered under this code:

Covered

- fitting of alternative steering boxes
- fitting of power steering systems
- fitting of dual control systems, e.g., street sweepers
- alteration of existing controls for modified cab configurations, e.g., island cabs
- fitting of tandem steering axle control systems
- conversions of left to right hand drive.

Not covered

- fitting of components not compatible with original vehicle design
- welding of steering shafts or linkages not in accord with VSB6
- use of chain driven steering system
- fitting of components not designed for automotive use.

2. Related standards

Modified vehicles must comply with all ADRs, Australian Standards, acts and regulations. Below are some but not all of the areas that may be affected by the modifications in this code and require certification, testing or evidence to demonstrate compliance.

The certifier must ensure that the modified vehicle continues to comply with all related ADRs.

This...	Must comply with...
Relocation of existing steering box	Good engineering practice Alternative manufacturer's specifications, if available
Fitting of power steering systems	VSB6 Section E — Front axle steering wheels and tyres Manufacturer's specifications
Fitting of dual control systems	VSB6 Section E — Front axle steering wheels and tyres
Modified cab configuration controls	VSB6 Section E — Front axle steering wheels and tyres VSB6 Section H — Chassis VSB6 Modification Code K1
Tandem steering axle controls	VSB6 Section E — Front axle steering wheels and tyres
Suspension substitution	VSB6 Modification Code F1
Repositioning brake system	VSB6 Section G — Brakes
Other changes to brake system	VSB6 Section G — Brakes
Chassis alteration	VSB6 Modification Code H4
Left to right hand drive	VSB6 Section E — Front axle steering wheels and tyres Manufacturer's specifications and good engineering practice
Cabin alteration	VSB6 Modification Code K3
Inspection and radiographic testing	AS 2177 — Radiography of Welded Butt Joints in Metal
Steering controls	ADR 42/..
Steering System	ADR 90/..

3. Certification procedure

The certification procedure for this modification code is as follows:

1. Modifier	Determine if the modification is within manufacturer specifications. <ul style="list-style-type: none"> • If yes, the modification will need to be done in accordance with manufacturer specifications. • If no, the modification will need to be done in accordance with this modification code.
2. Modifier	Consult with an accredited E2 AVE for guidance on how to perform the modification.
3. Modifier	Perform modification in accordance with AVE advice and this code.
4. Modifier	Organise approval inspection by an accredited E2 AVE.
5. E2 AVE	Perform inspection, complete E2 checklist and determine if compliance has been achieved: <ul style="list-style-type: none"> • If yes, proceed to step 6. • If no, do not proceed, advise modifier rework is required to ensure compliance. Return to step 2.
6. E2 AVE	Issue modification certificate, affix modification plate, and submit paperwork as required by the relevant AVE registration scheme.

AVEs must be satisfied that vehicle modification requirements are being met. It is advised that before modifications are carried out they are discussed with the certifying AVE.

4. Compliance requirements

Required:

- Ensure all replacement components are rated suitably for the vehicle (see VSB6 Section S — Vehicle rating).
- When modifying a vehicle, as far as possible keep within the original manufacturer's specifications and adhere to the recommendations of manufacturers of components. If no such recommendations exist, use the original equipment manufacturer's options where possible.
- 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.

Axle, steering or front wheels

- For steering system attachments, use threaded fastenings (unless supplied or specified by the sub-assembly manufacturer) equivalent to SAE Class 8 or ISO Grade 10.9 (see Australian Standard AS 1110) and assemble these using vehicle or component manufacturer's recommended tightening torques and locking methods.
- After modifications to the front axle, steering or front wheels, check the components under simulation for adequate clearance under full travel of the steering and the front suspension systems.

Standard parts

- Ensure all standard parts such as splines, tapers and keyways conform to the published standards, and mating parts to the corresponding matching standards.

Hoses, steel tubing and reservoirs

- Ensure hoses, steel tubing and reservoirs comply with the hydraulic standard, size, flow, and pressure rating recommended by the manufacturer of the steering box or power cylinder and these are located and secured suitably for ease of maintenance and top-up.
- Clear hose routing of heat sources and any moving parts.

5. Design requirements**Steering components****Required:**

- Design the steering system, including steering box, steering linkage, pitman arm or power cylinder so that it provides the levels of balance needed to meet performance requirements set out in *Steering systems performance requirements*.
- Give attention to:
 - maximum steering angles
 - steering arm length
 - steering linkage geometry
 - power cylinder installation geometry (ram type power steering)
 - pitman arm length and geometry (length, angular travel)
 - steering gear ratio
 - steering wheel diameter.
- Ensure the steering system incorporates compatible steering stop mechanisms that do not overload other components when the stops are engaged.
- Set steering stops strictly in conformance with the requirements set by the steering box manufacturer.
- If the length, cross-section or shape of a steering link is changed, perform stress calculations to determine that strength of the component has not reduced.
- Make drag links from one continuous length of material between end fittings.
- Ensure the caster angle is as specified by the vehicle manufacturer.
- The power steering system pressure relief valve must be integral with the steering box or linkage power cylinder.
- Fit the power steering system with a pressure relief valve that is properly adjusted.
- Reassess mounting strength of the steering system components if an adaptor bracket is used or the steering box is relocated.
- Mount all components in the steering system in such a manner that the mountings can withstand all possible operating loads without damage or excessive deflection.
- Ensure the manufacturer's ratings for the end fittings of the ball joints, plain bearings and idler arm pivots exceed the loads and angular movement requirements encountered in the modified vehicle.
- Provide guards to prevent fouling by moving components and potential injury to vehicle occupants.

Recommended:

- Mount any new steering box in the original steering box location or in an area of equivalent strength.
- Consider frame member reinforcement to obtain equal strength and rigidity in a new location.

Power cylinder**Required:**

- Design the power cylinder mounting for a ram type power steering to withstand the cylinder's peak loading and the resulting deflection.
- Ensure the resultant stress levels are well within the fatigue limit for the material of the steering mounting and not less, than the factor of safety provided by the original vehicle manufacturer for the parts of the assembly.

Power cylinder articulation

Most power cylinders used in ram type power steering systems operate with the axis in a near-horizontal position.

- Articulate the power cylinder to provide a direct axial force to the steering linkage through the full range of steering and suspension movement of the point of attachment to the steering linkage.

Recommended:

- Avoid mounting the power steering cylinder between the front axle beam and the tie rod.

Power steering pump**Required:**

- Mount the power steering pump securely on the engine by direct mounting provided by the engine manufacturer or belt driven on a suitably designed and adjustable bracket to give adequate belt contact and tension.
- Ensure the installed power steering pump meets the flow and pressure outputs as specified by the power steering box or power cylinder manufacturer.
- Ensure the power steering pump installation incorporates adequate cooling for the power steering fluid under all operating conditions. Achieve this by sufficient length of steel tubing to ensure adequate cooling.

Steering systems performance**Road testing****Required:**

- Road test the modified vehicle to confirm that the following requirements have been met:
 - The steering system provides safe and acceptable handling of the vehicle under all normal driving conditions, including abrupt manoeuvres to avoid obstacles.
 - The modified steering system is free from restrictions to movement within the operational range of steering.
 - Maximum and minimum steering effort is as indicated below.
 - The vehicle can achieve a turning circle with a maximum radius not exceeding 12.5 m.
 - Control sensitivity of the modified steering closely follows the profile of steering input to wheel movement of the original vehicle.

Minimum steering effort**Required:**

- Ensure minimum steering effort with power assist is not less than 5 N measured at the driver's steering wheel rim under any condition.

Maximum steering effort**Required:**

- Ensure maximum steering effort measured at the rim of the driver's steering wheel does not exceed 250 N, when tested under the following conditions:
 - The vehicle is loaded to its maximum permissible gross vehicle mass and correct load distribution with tyre

pressure as recommended by the vehicle and tyre manufacturers.

- The test starts with the steering gear in the straight ahead position and vehicle moving forward at a constant speed of 10 km/h or less.
- The steering wheel is turned at a constant rate so that in 4 s (6 s in the assist failure mode) the steering angle is that required to obtain a turning circle with a maximum radius not exceeding 12.5 m.
- Ensure the maximum steering effort is verified for both right and left turns.

Simulated power assist failure

Required:

- For power assisted steering systems, do not allow steering effort to exceed 600 N with simulated failure of complete power assistance and under the conditions specified above.

6. Installation requirements

The correct functioning of steering components is critical to vehicle safety.

Modification of pitman arms and other forged steel components

Required:

- If the pitman arm needs modification by heating, welding, bending, or drilling, stress-relieve it, and if welding has been carried out, subject the affected area of the arm to non-destructive X-ray inspection, with a certificate to confirm the component is sound.

Steering alteration

Required:

- Ensure modifications to steering systems are designed and carried out by appropriately experienced engineers and tradespersons.
- Ensure heating or welding is performed only by a qualified welder in strict accordance with the component manufacturer's instructions.
- Ensure all welded steering components meet AS 2177 - Radiography of Welded Butt Joints in Metal requirements.
- Select the steering components (steering box, power cylinders, rams, pitman arms) so that their ratings exceed the loads encountered in the modified vehicle.
- If the steering system is modified and the ratings of components or assemblies are not available, carry out stress analyses to prove that there is an adequate factor of safety (i.e., not less than that provided by the original vehicle manufacturer) for the most critically stressed parts of the assembly. This also entails verifying the material properties.
- Do not accept pneumatic power steering systems.

Recommended:

- Avoid cutting, welding, or heating steering components, particularly forged and heat treated components, unless essential to the correct functioning of the modified vehicle.
- Only undertake these methods when the final properties of the material can be predicted and confirmed.

Left to right hand drive conversions: Steering box relocation

Required:

- When a left-hand drive to right-hand drive conversion involves a steering box mounting relocation to the right hand side of the chassis, ensure the new mounting position and installation conforms to the original vehicle manufacturer's right-hand drive design details and specifications, if available.
- Alternatively, show the steering box installation to be equal to the original system in all safety and performance requirements, such as mounting strength and fatigue resistance.
- If a left-hand drive steering box assembly is modified to adapt it to the right-hand drive system, provide proof that no components (including the chassis) have been weakened or will be stressed more in the new application.

Left to right hand drive conversions: Steering control relocation

When making a right-hand drive conversion by transfer of the steering control only, leaving the steering box and linkage unchanged, address the following requirements:

Required:

- Ensure the torque capacity of all relay drive shafts, gears and joints is adequate and at least equivalent to the original steering input shaft and takes into account torque multiplication in relay gears etc.
- Fit dual universal joints to the cross shaft and key and lock all connections positively.
- Use mounting provided by the relay transmission manufacturer wherever possible, and do not distort or over-stress the part of the vehicle to which it is attached.
- Ensure that if industrial bevel or mitre drive transmissions are used, their rated static torque capacity provides a safety factor no less than that provided by the original manufacturer for the most highly stressed part of the steering assembly.
- Provide for adjustment to remove backlash on any relay transmission.
- Do not allow installation of the right-hand drive steering system in the cabin to limit the original vehicle manufacturer's specification for full cab tilt or other cab features.
- Ensure all steering column and pedal mounting brackets are original right-hand drive components, duplicated from original components or of adequate strength and performance.
- Ensure all components provided to ensure the driver is able 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 manufacturer's left-hand configuration.

Steering control relocation: Dual steering controls

With this type of modification, maintain the manufacturer's right-hand drive steering geometry without degrading either the function or durability of the steering system and apply the following controls:

Required:

- Provide proof that any modified or replacement component (e.g., steering column) has at least the same strength as the original and is free from defects.
 - Provide any additional steering components in the cabin of the vehicle (except the steering wheel) with guards to prevent fouling by other components or injury to vehicle occupants.
 - Ensure all electrical systems function correctly and in accordance with manufacturer's specifications and applicable ADRs.
 - Perform modifications to the vehicle's existing brake system in accordance with VSB6 Section G — Brakes and ensure installation of additional braking system controls meet the requirements of ADR 35/..
 - Ensure that the service brake failure visual indicator is visible from the additional driving position or additional indicators
- are installed; and the indicator(s) meets the requirements of ADR 35/...
 - Ensure that braking system modifications do not reduce service or parking brake performance and do not impair correct functioning of original equipment, including failure warning and secondary braking systems.
 - Install additional rear vision mirrors on the right side of the vehicle to ensure the driver, when seated in the left side driving position, has adequate rear vision for all conditions.
 - Attach signs to the vehicle in a prominent position adjacent to steering controls to indicate safety and operating procedures.
 - Place throttle, brake, and clutch in conventional locations in both driving positions.
 - Ensure that the left side driving position is fitted with all components required to ensure the driver is able to safely operate the vehicle, such as instruments, rear vision mirrors, windscreen wipers and washers. 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 manufacturer's right hand configuration.
 - Perform all chassis modifications in accordance with VSB6 Section H — Chassis if necessary.

E2 Checklist — Steering alteration (example)

E2 Checklist — Steering alteration

This checklist is for use by approved vehicle examiners (AVEs) to assess and certify steering alterations.

Vehicle and modifier details

Vehicle make:	Vehicle model:	Month and year of manufacture:
VIN (if applicable):	Vehicle chassis no. (if applicable):	Vehicle modifier (company name):

Advanced braking systems

Braking systems	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Is the advanced braking system (where fitted) un-affected or re-certified after the vehicle modification?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Modification details

Modification criteria	Check Yes, No as applicable:	Yes	No
1 Has the modification been performed in accordance with the manufacturer's guidelines?		<input type="checkbox"/>	<input type="checkbox"/>

Installation details

Steering alteration	Applicable: <input type="checkbox"/>	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Have all welded components been shown to be free of defects by radiographic testing in accordance with AS 2177 — <i>Radiography of Welded Butt Joints in Metal?</i>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Do all replacement/modified components have a mass rating suitable for the mass rating of the vehicle?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Are all components mounted in such a manner that the mountings can withstand all possible operating loads without damage or excessive deflection?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 In the case of a power steering system, has a pressure relief valve been fitted and properly adjusted?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Are all hoses and reservoirs in accordance with the manufacturer's recommendations for size, flow and pressure rating, and clear of exhaust components and regions where they possibly may suffer abrasion?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Does the steering system have adequate clearance throughout the operating range and suspension travel?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Has all heating/welding been performed by a qualified person in accordance with the axle manufacturer's instructions?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Have all chassis modifications been performed in accordance with VSB6 Section H — Chassis (as applicable)?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 Have all brake system modifications been performed in accordance with VSB6 Section G — Brakes?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 Have all cabin modifications been performed in accordance with VSB6 Section K — Cabin?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Left to Right Hand Drive Conversion	Applicable: <input type="checkbox"/>	Check Yes, No, N/A as applicable:	Yes	No	N/A
11 Has the manufacturer's steering geometry been maintained?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12 Has the steering system been shown to conform to the vehicle manufacturer's right-hand drive design specifications or demonstrated to equal the original system in all levels of safety and performance?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13 Are all modified or replacement components equal in strength to the original components and free from defects?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14 Are all steering column and pedal mounting brackets original right-hand drive components, duplicated from original components, or of adequate strength and performance?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15 Have all modified or replacement components been demonstrated to equal the original components in strength and performance and shown to be free of defects?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dual steering alteration	Applicable: <input type="checkbox"/>	Check Yes, No, N/A as applicable:	Yes	No	N/A
16 Has the manufacturer's right-hand drive steering geometry been retained?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17 Have all modified or replacement components been demonstrated to equal the original components in strength and performance and shown to be free of defects?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18 Have all additional moving components in the cabin (except the steering wheel) been provided with guards to prevent fouling with other components or causing injury to vehicle occupants?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19 Do all electrical systems function correctly in accordance with manufacturer specifications and Australian Design Rules (ADR) requirements?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 Have additional rear vision mirrors been installed on the right-hand side of the vehicle to ensure the driver, when seated in the left-hand driving position, has adequate rear vision?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21 Have suitable signs indicating safety and operating procedures been attached in a prominent position adjacent to the steering controls?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22 Are throttle, brake and clutch control pedals in conventional positions in both driving positions?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23 Has a speedometer been installed so its indication is readily visible to the driver when seated in both driving positions?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Vehicle chassis no./VIN:	Date:	Signed:

E2 Checklist — Steering alteration

🔍 This checklist is for use by approved vehicle examiners (AVEs) to assess and certify steering alterations.

Compliance

Modification	Check Yes, No as applicable:	Yes	No
1 Does this modification meet all the requirements of the manufacturer's guidelines / Modification Code E2?		<input type="checkbox"/>	<input type="checkbox"/>
2 Is the quality of the work to an accepted industry standard?		<input type="checkbox"/>	<input type="checkbox"/>
3 Does the vehicle continue to comply with ADRs and heavy vehicle standards regulations affected by the modification?		<input type="checkbox"/>	<input type="checkbox"/>

Authorisation

Other than modification criteria, if the answer to any relevant question is **NO** the modification is not acceptable.

Comments:			
Examined by:	Company (if applicable):	AVE no.:	
Signed:	Modification certificate no.:	Modification plate no.:	Date:

Vehicle chassis no./VIN:	Date:	Signed:

E2 Modification report — Front axle and steering (example)

E2 Modification report — Front axle and steering

⚠ This report is for use by engine installers and approved vehicle examiners (AVEs) when performing or assessing modifications to front axle and steering components. Modifications to these components should only be carried out by qualified persons as they are fundamental to vehicle safety. Do not cut, weld or hot work any forged steering component unless absolutely essential to the correct functioning of the modified vehicle.

1. Vehicle details

		Report no.:
Vehicle make:	Vehicle model:	Month and year of manufacture:
VIN (if applicable):	Vehicle chassis no. (if applicable):	Vehicle modifier (company name):

2. Type of steering conversion

Component modified	Type of modification / describe components used
<input type="checkbox"/> Additional steering axle	<input type="checkbox"/> Deleted <input type="checkbox"/> Retained <input type="checkbox"/> Added <input type="checkbox"/> Modified
<input type="checkbox"/> Change of steering axle	<input type="checkbox"/> Deleted <input type="checkbox"/> Retained <input type="checkbox"/> Added <input type="checkbox"/> Modified
<input type="checkbox"/> LH/RH conversion	<input type="checkbox"/> Deleted <input type="checkbox"/> Retained <input type="checkbox"/> Added <input type="checkbox"/> Modified
<input type="checkbox"/> Dual steering control	<input type="checkbox"/> Deleted <input type="checkbox"/> Retained <input type="checkbox"/> Added <input type="checkbox"/> Modified
<input type="checkbox"/> Change of steering box	<input type="checkbox"/> Deleted <input type="checkbox"/> Retained <input type="checkbox"/> Added <input type="checkbox"/> Modified
<input type="checkbox"/> Other (describe)	<input type="checkbox"/> Deleted <input type="checkbox"/> Retained <input type="checkbox"/> Added <input type="checkbox"/> Modified

3. Describe modified steering system and include diagram (attach to file)

Vehicle chassis no./VIN:	Date:	Signed:

E2 Modification report — Front axle and steering

⚠ This report is for use by engine installers and approved vehicle examiners (AVEs) when performing or assessing modifications to front axle and steering components. Modifications to these components should only be carried out by qualified persons as they are fundamental to vehicle safety. Do not cut, weld or hot work any forged steering component unless absolutely essential to the correct functioning of the modified vehicle.

4. Component modifications and method of safety assessment

Component name	Modification	Safety assessment method (tick box if supplying evidence)					
		Physical test results	Stress calculation	Penetrant dye check	Hardness test results	Drawings or sketches	Photographs
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Component name	Modification	Safety assessment method (tick box if supplying evidence)		
		Material specifications	Details of heat treatment	Other
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If any of the evidence required is not available, state reason:

Modification			
1	What is the steering power source? <input type="checkbox"/> Manual <input type="checkbox"/> Hydraulic <input type="checkbox"/> Other (describe)		
2	Has the maximum stress on original components been increased by the modification?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
3	How are original components assessed as functionally safe if the stress is greater than the original stress input?		
4	With power assisted steering systems, state relief valve pressure setting?	Original	kPa
5	What is the turning circle in meters of vehicle?	Original	m
6	What is the steering effort at the steering wheel of the modified vehicle fully laden when tested in accordance with VSB6 Section E — Front axle steering wheels and tyres?	Normal operation	Kg
7	Maximum permissible weight per axle?	Standard	Kg
8	Does this conversion have in-principle approval from the original equipment manufacturer (OEM)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9	Evidence of approval from OEM		

Comments:			
Examined by:	Company (if applicable):		AVE no.:
Signed:	Modification certificate no.:	Modification plate no.:	Date:

Vehicle chassis no./VIN:	Date:	Signed:

Modification Code E3 — Fitting of non-standard front wheel components

1. Scope

Modifications covered under this code:

Covered

- fitting of non-standard front wheels, i.e., rims or tyres.

Not covered

- fitting of front wheels, i.e., rims or tyres that are not compatible with the original vehicle's specifications
- modifications to wheel rim assemblies, other than those permitted by the wheel rim manufacturer
- welding or alteration to wheel rim or steering components
- fitting of front wheels, i.e., rims or tyres that exceed the regulatory limits on vehicle dimensions
- fitting of alternative rims and tyres to the rear axles (see VSB6 Modification Code D3).

2. Related standards

Modified vehicles must comply with all ADRs, Australian Standards, acts and regulations. Below are some but not all of the areas that may be affected by the modifications in this code and require certification, testing or evidence to demonstrate compliance.

The certifier must ensure that the modified vehicle continues to comply with all related ADRs.

This...	Must comply with...
Replace front axle	VSB6 Section E — Front axle steering wheels and tyres
Width of vehicle (max. of 2.5 m)	ADR 43/..
Brakes	VSB6 Section G — Brakes
Re-rating of GVM/GCM	VSB6 Section S — Vehicle rating VSB6 modification codes S1 and S2
Turning circle (max. radius of 25 m)	ADR 43/..
Steering	VSB6 Modification Code E2
Suspension substitution	VSB6 Modification Code F1
Fitting of power steering systems	Manufacturer's specifications VSB6 Section E — Front axle steering wheels and tyres
Tyres	ADR 42/.. ADR 92/.. ADR 93/..

3. Certification procedure

The certification procedure for this modification code is as follows:

1. Modifier	Determine if the modification is within manufacturer specifications. <ul style="list-style-type: none"> If yes, the modification will need to be done in accordance with manufacturer specifications and no modification approval is required. If no, the modification will need to be done in accordance with this modification code.
2. Modifier	Consult with an accredited E3 AVE for guidance on how to perform the modification.
3. Modifier	Perform modification in accordance with AVE advice and this code.

4. Modifier	Organise approval inspection by an accredited E3 AVE.
5. E3 AVE	Perform inspection, complete E3 checklist and determine if compliance has been achieved. <ul style="list-style-type: none"> If yes, proceed to step 6. If no, do not proceed, advise modifier rework is required to ensure compliance. Return to step 2.
6. E3 AVE	Issue modification certificate, affix modification plate, and submit paperwork as required by the relevant AVE registration scheme.

AVEs must be satisfied that vehicle modification requirements are being met. It is advised that before modifications are carried out they are discussed with the certifying AVE.

4. Fitting non-standard front wheel requirements

Non-standard rims and tyres on front axles are defined as those with a section width exceeding the original equipment supplier's specifications by more than 40 mm or, when installed, increase the front track width by more than 25 mm of the original vehicle manufacturer's specification.

Fitting wheels to a vehicle that are wider than standard specification alters the track and scrub radius, which is the distance between the centre of the contact area that a tyre makes with the road and the theoretical point where the centre line of the steering axis meets the ground.

Non-standard front wheels, tyres, or rims

Apply the following when a vehicle is modified by fitting non-standard front wheels, tyres, or rims:

Required:

- Ensure that when the wheels are in the straight ahead position, the wheels and tyres do not project beyond the extreme width of the mudguards or cause the vehicle width to exceed the vehicle's maximum permitted width.
- Assess the impact of the modification on maximum axle capacity and the vehicle's gross vehicle mass (GVM). Where necessary, a revised GVM rating as per VSB6 modification codes S1 and S2 (if applicable) may be required.
- When fitting non-standard front wheels, rims or tyres, take into account the axle manufacturer's reduction in ground axle mass rating (GAMR) due to the increase in bending moment. This reduced rating compensates for the increase in bending moments that cause reduced wheel bearing life and increased kingpin and stub axle loads.
- Wheel spacers are not permitted to be fitted unless permitted by the vehicle manufacturer.
- Consider the outcomes that may result from fitting non-standard front wheels, such as: wheel alignment issues, possibility of wheels fouling vehicle componentry, tyre life reduction and changing angles of the steering mechanism.
- 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.
- Maintain compliance with turning circle requirements from ADR43/.. or the relevant heavy vehicle standards regulation.

⚠ The fitting of wider tyres may increase the likelihood of aquaplaning under lightly laden conditions.

✎ When fitting non-standard tyres ensure tyre pressure specified correlates with the load rating as per the Tyre and Rim Association of Australia.

Recommended:

- Consider any impact that altered wheel track may have on axle loadings, taking into account the original axle manufacturer's specifications.
- Consider any impacts that a change in wheel offset may have on increased bending moments and reduced wheel bearing life.
- Fit wider rims with a positive offset, as this allows them to clear suspension and steering components but with the following effects:
 - the vehicle will have heavier steering
 - loads on steering linkages and the steering system will increase
 - loads on wheel bearings will increase.

Replacement tyres

Wheel rim widths, flange heights and flange angles affect the service life, performance and safety of a tyre and rim. Fitting tyres to incorrect rims can lead to premature wheel failure.

Required:

- Only fit tyres to their approved rims.
- Only fit tyres to wheel rims that are approved by the Tyre and Rim Association of Australia or comply with ADR 42/.., ADR 95 or ADR 96/...
- If the wheel or tyre types to be used are not approved or addressed by the Tyre and Rim Association of Australia or standards permitted by ADR 42/.., 95/.. or 96/.., the wheel combination must only be fitted if approved by the relevant heavy vehicle regulator.

Offset of tie-rod arms

The offset of tie-rod arms dictates the Ackermann geometry generated during turns, where the inside wheel will turn at a sharper angle than the outside wheel. If incorrect tie-rod arms are used, increased tyre wear, vehicle understeer and an increased turning circle could result.

Recommended:

- Assess the Ackermann geometry and confirm the modified vehicle complies with the turning circle requirement (maximum radius of 25 m) of ADR 43/.. or the relevant heavy vehicle standards regulation.

Increased tyre and wheel mass

Following modification, any increase in tyre and wheel mass may cause increased loading on steering componentry, including power steering pumps, and increased scrub radius and dynamic loading (the loading on a wheel while it is rotating) in the steering system. During operation, the gyroscopic effect due to the rotation of the wheel will result in increased dynamic loads imposed on the steering system with any impact forces (i.e., from hitting a pothole) experienced by the wheel, resulting in violent wheel oscillations.

Factors that may contribute to this include:

- vehicle speed
- mass of the rotating tyre, rim, brake drum and hub assembly
- condition of the dampers
- vertical load on the front axle
- axle caster.

Failure to maintain the relationship between drag link geometry, and the original steering arm ball stud centreline, the front spring eye centreline and the pitman arm ball stud centreline may result in bump or roll steer (i.e., front wheel oscillation about the kingpin as the suspension is displaced).

Reduced GAMR may affect the vehicle's GVM and therefore require a revised GVM rating as per VSB6 Modification Code S2 approved design certification.

Required:

- Consider loading when planning and evaluating modifications.
- When replacing a front axle assembly, maintain the original drag link geometry relative to the original steering arm ball stud centreline, the front spring eye centreline, and the pitman arm ball stud centreline.

Recommended:

- Consider contributing factors to increased dynamic loads imposed on the steering system when planning and evaluating modifications.

E3 Checklist — Fitting of non-standard front wheel, i.e., tyre or rim (example)

E3 Checklist — Fitting of non-standard front wheel, i.e., tyre or rim

This checklist is for use by approved vehicle examiners (AVEs) when assessing and certifying the fitting of a non-standard front wheel, i.e., tyre or rim.

Vehicle and modifier details

Vehicle make:	Vehicle model:	Month and year of manufacture:
VIN (if applicable):	Vehicle chassis no. (if applicable):	Vehicle modifier (company name):

Axle and wheel details

Front axle make and model:	Current front axle rating (kg):	Updated front axle rating (kg) if any with new wheel, i.e. tyre or rim:
Wheel rim manufacturer:	Rim size and offset:	Tyre size:

Advanced braking systems

Braking systems	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Is the advanced braking system (where fitted) un-affected or re-certified after the vehicle modification?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Installation details

Wheels and tyres	Check Yes, No as applicable:	Yes	No	
1 When in the straight ahead position, do the wheels and tyres of the vehicle remain within the extreme width of the mudguards and the maximum width limit for the vehicle (2.5 metres)?		<input type="checkbox"/>	<input type="checkbox"/>	
2 Are replacement tyres and wheel rims approved as suitable by the Tyre and Rim Association of Australia, by the tyre manufacturer or comply with the standards permitted by Australian Design Rule (ADR) 42/., 95/., or 96/.. and have they been fitted in accordance with relevant ADRs?		<input type="checkbox"/>	<input type="checkbox"/>	
Axles	Check Yes, No, N/A as applicable:	Yes	No	N/A
3 Has a ground axle mass rating of original or replacement front axle componentry been established to ensure the mass ratings of componentry being utilised are not exceeded?		<input type="checkbox"/>	<input type="checkbox"/>	
Steering	Check Yes, No, N/A as applicable:	Yes	No	
4 Have the steering components been checked for adequate clearance of all componentry under full movement of the steering wheel from lock to lock and full suspension travel?		<input type="checkbox"/>	<input type="checkbox"/>	
5 Has the fitting of non-standard front wheel taken into consideration the potential effect of changed loads on steering components, wheel bearing etc.?		<input type="checkbox"/>	<input type="checkbox"/>	
6 Are the steering linkages adequate for the loads encountered due to this modification?		<input type="checkbox"/>	<input type="checkbox"/>	
7 Has consideration been given to the steering geometry (wheel alignment), wheels fouling vehicle componentry, tyre life and changing angles of the steering mechanism resulting in changes to the turning circle of the vehicle?		<input type="checkbox"/>	<input type="checkbox"/>	
8 Have the result of increased tyre and wheel mass and an increased scrub radius causing higher dynamic loadings (the loading on a wheel while it is rotating) which may be imposed on the steering componentry, been considered when planning and evaluating the modifications?		<input type="checkbox"/>	<input type="checkbox"/>	
9 Does the modification ensure the vehicle continues to have a turning circle in either direction, as determined by reference to the extreme outer edge of the tyre track at ground level and not exceeding 25 metres in diameter?		<input type="checkbox"/>	<input type="checkbox"/>	
Summary	Check Yes, No, N/A as applicable:	Yes	No	
10 If the vehicle gross vehicle mass (GVM) rating has been affected by the modification, has certification been carried out in accordance with VSB6 Section 5 — Vehicle rating?		<input type="checkbox"/>	<input type="checkbox"/>	

Compliance

Modification	Check Yes, No as applicable:	Yes	No
1 Does this modification meet all the requirements of the manufacturer's guidelines / Modification Code E3?		<input type="checkbox"/>	<input type="checkbox"/>
2 Is the quality of the work to an accepted industry standard?		<input type="checkbox"/>	<input type="checkbox"/>
3 Does the vehicle continue to comply with ADRs and heavy vehicle standards regulations affected by the modification?		<input type="checkbox"/>	<input type="checkbox"/>

Vehicle chassis no./VIN	Date:	Signed:

E3 Checklist — Fitting of non-standard front wheel, i.e., tyre or rim

📌 This checklist is for use by approved vehicle examiners (AVEs) when assessing and certifying the fitting of a non-standard front wheel, i.e., tyre or rim.

Authorisation

Other than modification criteria, if the answer to any relevant question is NO the modification is not acceptable.

Comments:			
Examined by:	Company (if applicable):	AVE no.:	
Signed:	Modification certificate no.:	Modification plate no.:	Date:

Example Only

Vehicle chassis no./VIN	Date:	Signed: