



Section 4

Steering and Suspension

Objective:

To ensure that the steering and suspension is in good working order and allows the driver effective control of the vehicle.

Australian Design Rules relevant to this section

ADR 42 General safety requirements

ADR 43 Vehicle configuration and dimensions

ADR 90 Steering Systems

4.1. Check steering components inside cabin

Reasons for rejection

- Steering wheel is not located in the centre or to the right-hand side of the vehicle unless the vehicle is built and used for a purpose other than the transportation of goods or people
- The steering wheel is loose on the shaft
- The steering column is insecure
- The steering wheel structure is fractured or the hub, rim, moulding or spokes are loose
- Any steering component is missing, loose, cracked, heated, bent, welded, damaged or inoperative

- A steering wheel spinner knob is fitted without approval

4.2. Check steering free play

Reason for rejection

- With the road wheels in the straight ahead position and the engine running (if the vehicle has power steering), rotational free play measured at a point on the steering wheel exceeds the limits in Table 4.1, without road wheel movement.

Table 4.1 Steering wheel diameter and free play

Steering wheel diameter (mm)	Movement (mm)
up to 450	75
over 450	100

4.3. Check steering components under the bonnet/cab and under the vehicle

Reasons for rejection

- Any steering component is missing, cracked or broken
- Any steering component fouls another component under any combination of steering and/or suspension travel
- Any threaded, splined or tapered joint is loose

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- d. Any free-play due to wear in a ball-joint exceeds manufacturer's specifications. Where these are not known or are no longer appropriate, the free-play exceeds 3mm

⚠ Some ball type steering joints are spring loaded or are designed to have a certain amount of play.

- e. Any steering component can be seen to have been repaired or modified by heating or welding

⚠ Except where an original component has been fitted by the manufacturer or repairs have been conducted to the manufacturer's specifications.

- f. Any nut, bolt or locking device is missing or insecure
- g. Where steering forces are wholly supplied by energy sources other than a driver's muscular effort, visible indicators for steering failure or defect are not fitted
- h. The power steering pump has loose mounting bolts cracked or broken mounting brackets, braces or adaptors,
- i. Power steering pump pulleys are cracked, broken or loose
- j. Power steering pump belts are loose, cracked through to reinforcing plies, extensively frayed or missing drive sections
- k. Evidence of oil or fluid leaking from any power steering components

⚠ Dampness or staining around seals is acceptable.

- l. With the wheels off the ground, the steered road wheels do not turn freely to the left and right through their normal range of travel
- m. Steering shaft is not securely connected to the steering box or rack, or is incorrectly aligned or adjusted
- n. Steering box, rack and pinion assembly, mounting brackets, bolts or couplings are cracked or not securely fixed to the vehicle
- o. Play at the end of the idler arm exceeds manufacturer's specification, or 8mm where unknown

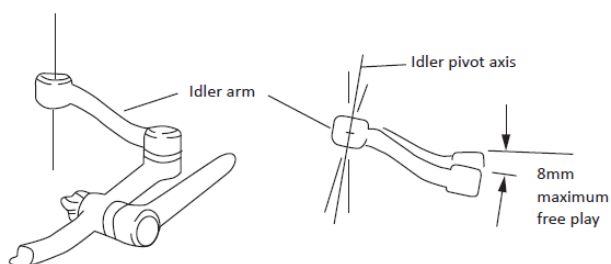


Figure 4.1 Idler arm free play

- p. Free play at the steered road wheel rim in a horizontal or vertical plane (excluding any necessary wheel bearing play) exceeds manufacturer's specifications. Where these specifications are not known or are no longer appropriate, free play exceeds the limits in Table 4.2

Table 4.2 Rim diameter and free play

Rim diameter (mm)	Free play (mm)
up to 405	7.0
over 405 to 455	10.0
over 455	13.0

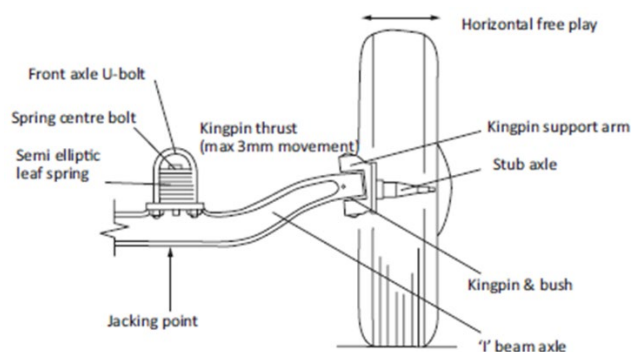


Figure 4.2 Typical 'I' beam axle

- q. Steering components are worn beyond manufacturer's specification, or 3mm where unknown
- r. Any tyre fouls on any part of the vehicle through the normal range of travel.

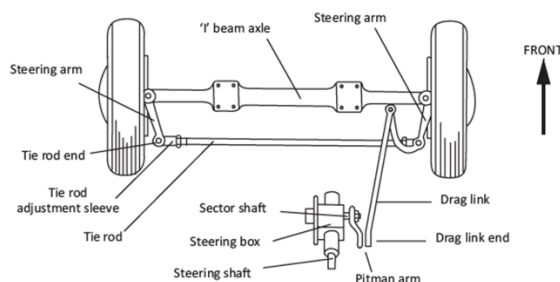


Figure 4.3 Steering linkage typical of most heavy vehicles

4.4. Check suspension components

Reasons for rejection

- a. U-bolts or other spring to axle or spring pack clamp bolts, centre bolts, spring eyes or hangers, torque, radius or tracking component assemblies, control arms, sway bars, bushes or any parts used to attach them to the vehicle frame or axle are cracked, loose, broken, missing or worn beyond manufacturers' limits

⚠ Superficial crazing is acceptable on rubber bushes. This is often present on rubber suspension components even when new. Some vehicle suspensions are designed to move within their rubber bushing considerably.

In some cases, suspension manufacturers utilise "voided" style bushes which allow significant articulation of suspension arms, etc. Where "voided" bushes are fitted please refer to the suspension manufacturer's inspection requirements.

- b. Any bolts or fasteners do not fully engage all threads of the nut
- c. Any nut, bolt or locking mechanism is insecure or missing
- d. Springs are cracked, broken, missing or damaged

⚠ Superficial crazing is acceptable. This is often present on rubber suspension components even when new.

- e. Springs (including air bags) are sagged or air bag/ components leak
- f. Leaves in a leaf spring are displaced sideways more than 10% of their width or so that they contact wheels, brakes or the frame
- g. Any walking beam type suspension has signs of damage to beam
- h. Shock absorbers, if originally fitted, are missing, loose, inoperative or leaking

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⚠ Shock absorber misting is not considered leaking. For further information refer to Additional Information – Shock Absorber Leakage and Misting.

- i. Shock absorber mountings or bushes are not secure or damaged.
- j. Any suspension component is not correctly aligned or is damaged, cracked, loose or broken
- k. Any nut, bolt or locking mechanism is insecure or missing
- l. Suspension components are modified without approval, missing, repaired or modified by heating or welding (unless permitted by the manufacturer).

⚠ Heating or welding suspension components may adversely affect their strength. Any heating of suspension components should only be in consultation with the vehicle or component manufacturer.

For information on modifications please refer to Appendix B – Vehicle Modifications.

4.5. Additional information - Shock Absorber Leakage and Misting

Misting

By design, the piston rod carries a film of oil through the rod seal to lubricate the seal lips, thereby reducing friction and wear at the seal contact area, and prolonging seal life. Misting occurs when the hot piston rod is drawn out of the shock body and the microscopic film of hot oil on the rod turns to vapour. This vapour, or mist, condenses when it reaches the cooler outside air, and forms a film on the outside of the shock body.



Figure 4.4 Examples of misting shock absorbers

Leaking

Rod seals may leak as a result of extreme wear, contamination, or defect. A leaking shock will show clear signs of oil leaking in streams from the upper seal down the shock body and may drip

from the shock. Leaking is not acceptable and is a reason for rejection.

The film will attract road dust and debris, and will often coat the entire body of the shock. Misting is normal and is not a reason for rejection.

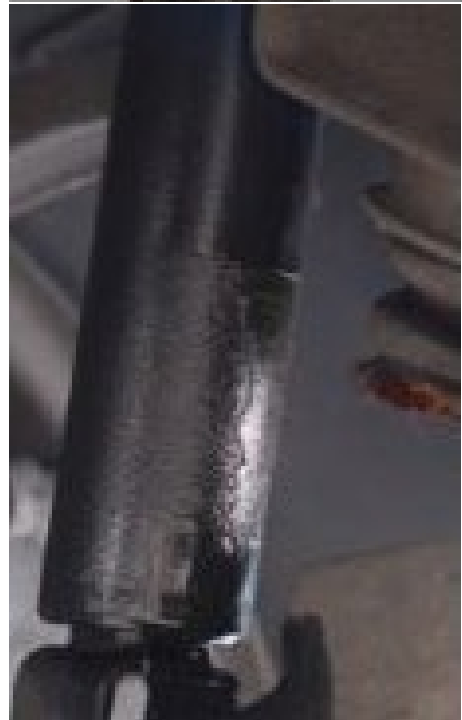


Figure 4.5 Examples of leaking shock absorbers

⚠ Some minor streaking of oil may appear on a new shock body during initial stroking. This is the result of the seal 'setting' and purging any oil (from assembly) from the seal. This is not to be mistaken as a failure, as it is temporary and totals only a few millilitres of oil