



## Section 3

# Couplings

⚠ This section should be read in conjunction with ADR 62, ADR 63, relevant Australian Standards and manufacturers' specifications for minimum requirements.

Installation of an aftermarket coupling is a modification. Please refer to Appendix B – Vehicle Modifications.

### Objective

To ensure that all tow couplings and associated components are in a serviceable condition and that they provide the necessary load carrying capacity.

### Australian Design Rules relevant to this section

ADR 62	Mechanical connections between vehicles
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ADR 63	Trailers designed for use in road trains
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### 3.1. Check fifth wheels and turntables

In this section, the term 'fifth wheel' refers to the upper surface of the coupling that directly articulates with the skid plate of a semitrailer. A 'turntable' is the rotating part of the coupling mount that allows the fifth wheel to rotate, for example a ballrace.

### Reasons for rejection

- The fifth wheel does not display the manufacturer's name/trademark, nominal size (e.g. 50mm) and the 'D-value' rating
- The top and bottom mounting flanges have insufficient or ineffective fasteners
- Fasteners either side of the mounting frame, plate or pivot brackets are insufficient or ineffective
- Fifth wheel or turntable mounting plate or sub-frame assembly securing bolts are missing, broken or loose, or the fasteners are U-bolts
- Fifth wheel or turntable mounting plate or sub- frame assembly securing bolts are not ISO Class 8.8 (SAE Grade 5) or manufacturer's specification
- Fifth wheel or turntable mounting is not done in accordance with manufacturers' specifications, Australian Standards or VSB6 Section P2
- There is movement between the fixed mounting components
- Horizontal movement exceeds manufacturer's specification, or 5mm where unknown, between:
  - the pivot bracket pin and bracket, or
  - a slider bracket and slide base.

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- i. There are cracks in mounting angles or plates, pivot brackets, slider components or coupler plates except for casting shrinkage cracks
- j. The fifth wheel pivot bracket pin/s or bushes are missing, insecure or worn beyond manufacturer's specifications
- k. The locking mechanism on either side of a sliding coupling is missing, inoperative or worn beyond manufacturer's specifications
- l. End stops on slides are missing or insecure
- m. Kingpin locking mechanism parts are missing, worn or adjusted beyond manufacturer's specifications, or damaged to the extent that the kingpin is not securely held
- n. The top and bottom plates, flanges and welds are loose, cracked, missing or broken
- o. Ball bearing type turntables are worn beyond the manufacturer's specifications, or to the extent that the upper and lower flanges or bearing halves touch each other or the ball bearings seize.

➤ The fifth wheel feet shall be secured to the base plate either using bolts or by welding. Bolting is preferred

- welding is only permitted if the manufacturer recommends this method.
- Trailer skid plates and kingpins are covered in Sections 14.5 and 14.6 of this manual.

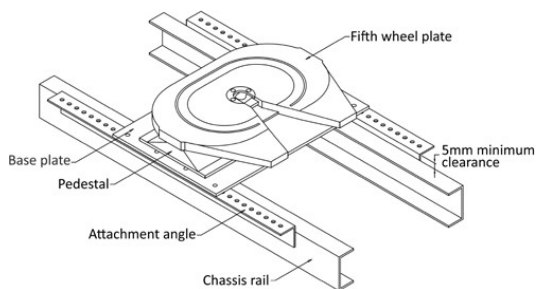


Figure 3.1 Fixed base fifth wheel assembly

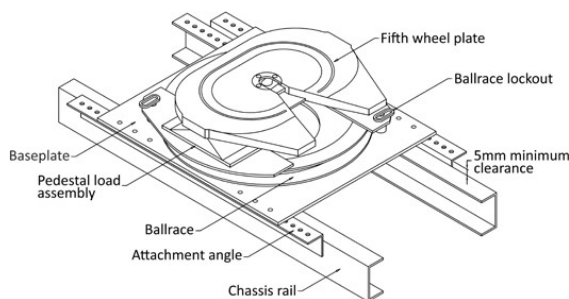


Figure 3.2 Ballrace base fifth wheel assembly

### 3.2. Check pin couplings, ball couplings and pintle hooks

#### Reasons for rejection

- a. Where ADR 62 applies, a 50mm pin type coupling does not display the manufacturer's name/trademark, rated vertical load and the 'D-value rating'
- b. The ball coupling or hook assembly (e.g 127mm or hook type) is not legibly and indelibly marked with the manufacturer's name or trademark and the rated 'D-value'
- c. Any fasteners or welds are deformed or cracked

- d. Any mounting bolts, fasteners or weld beads have advanced corrosion
- e. The area that the coupling is mounted on is loose or cracked or any locking mechanism is not fitted or is inoperative
- f. Couplings are worn beyond the manufacturer's limits. (see Figure 3.3) If the manufacturer's limits are not known, allowable dimensions are given in Table 3.1.

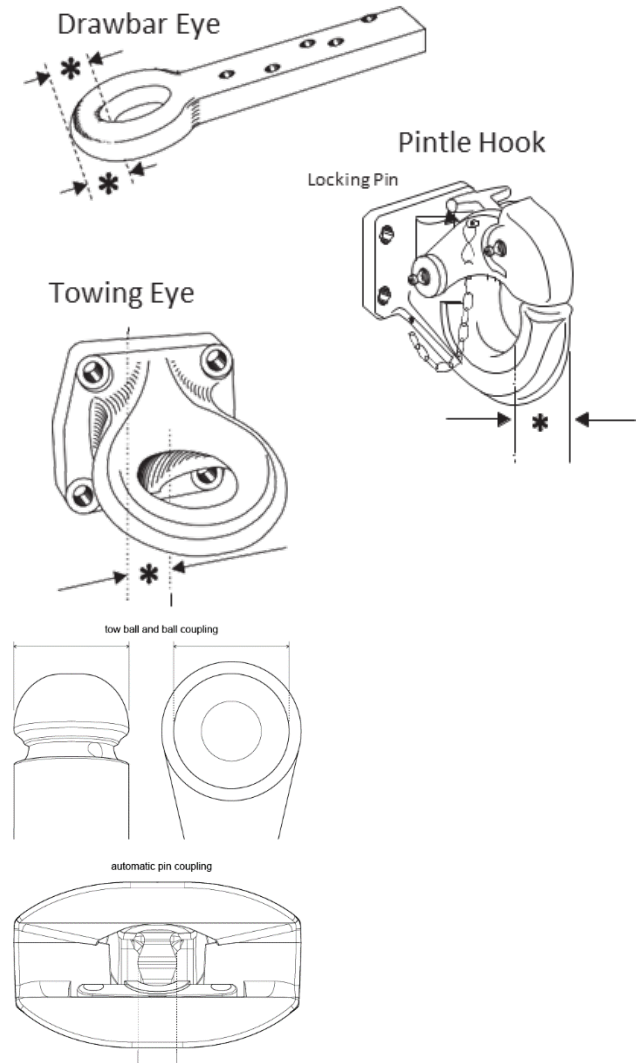


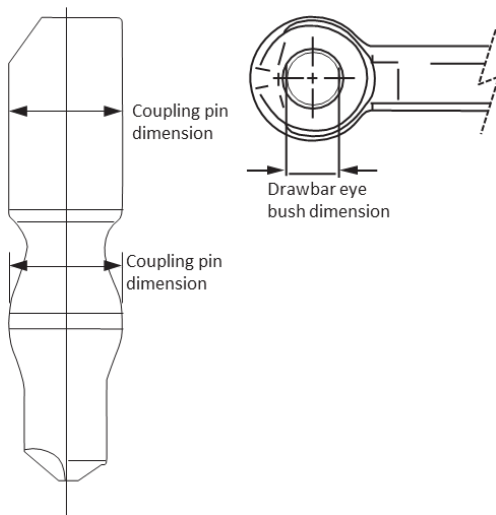
Figure 3.3 Typical tow devices

Table 3.1. Allowable dimensions in millimetres for worn components

Component	Standard dimension	Allowable wear limit	Gauge Sizes
Coupling pin	48.7 OD	47.2 min	47.1
Drawbar eye bush	50.0 ID	51.5 max	51.6
Pintle hook	Wear surface of the horn of a pintle hook is worn more than 5% of the original diameter		
Tow ball and ball couplings	Due to the large variance in wear limits for tow ball and ball couplings please refer to manufacturer's specifications		

➤ When the wear of components is checked by direct measurement, it should be noted that an elliptical wear pattern is generated on the bore of the drawbar eye bush, and on the outside of the pin.

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**Figure 3.4 Measurement of coupling pin and drawbar eye bush wear**

- g. A drawbar eye block has any transverse or circumferential welds
- h. For bolt-in drawbar eyes, the castellated nut is loose or insecure or the split pin is missing or not intact.

### 3.3. Check towbar

#### Reasons for rejection

- a. The towbar is not securely mounted or is bent or cracked
- b. Any mounting bolts, fasteners or weld beads have advanced corrosion or cracks
- c. A towbar or towing ring, where ADR 62 applies, does not display:
  - the manufacturer's name/trademark
  - the rating; and
  - the make and model of the vehicle/s for which it is designed
- d. Where any part of the towbar is removable (the bolts, studs, nuts etc.), fastening those parts do not have a locking device such as a U-clip, split pin or nylon lock nut
- e. Towbar assembly (except for vehicles designed for use in road trains) is not fitted with two safety chain attachments mounted one on either side of, and adjacent to, the tow coupling
- f. Safety chain attachments are not affixed to part of the tow assembly that is permanently attached to the vehicle.

Always check the underside of drawbar and drawbar eye for excessive wear and cracks.

### 3.4. Check towing attachments

#### Reasons for rejection

- a. Any towing attachment (such as a tow-ball or pintle hook), any mounting bolts, fasteners or weld beads are loose, cracked, broken or extensively corroded
- b. Safety chain/s or cables (if required) are able to be connected or affixed in such a way that the safety chain/s or cables are liable to accidentally disconnect
- c. Safety chain or cable retaining brackets are cracked, deformed or insecure

- d. Safety chain or cable retaining brackets do not meet required standards
- e. The tow coupling capacity does not equal or exceed the aggregate trailer mass (ATM) of any trailer being towed (if applicable).

For further information on safety chains, refer to Additional Information – Safety Chains.

### 3.5. Additional information - Safety Chains

#### Safety chains for:

- trailers in excess of 3.5 tonnes ATM
  - trailers in excess of 2.5 tonnes GTM
- with fixed or rigid drawbars and automatic pin type couplings.

All fixed or rigid drawbar trailers (other than a converter dolly) and any other trailers without breakaway brakes, require safety chains to be fitted.

It is strongly recommended that all other trailers be fitted with safety chains, especially vehicles used in severe conditions, e.g. quarry vehicles which are jack-knifed regularly for unloading.

Safety chains complement the safety features of the trailer's breakaway braking system, allowing the driver to maintain control of the truck and trailer combination following a coupling failure or disconnection.

Safety chains **MUST** be supplied and fitted to comply with the following requirements:

#### Type of chain

Safety chains fitted to a trailer with an ATM over 3.5 tonnes, must be manufactured from alloy steel with a minimum breaking stress of 800MPa to conform with the mechanical properties of Grade T chain as specified in Australian Standard AS 2321 *Short-link chain for lifting purposes*.

#### Required number and size of chains

##### Two separate chains must be used

The minimum breaking strength or size of each chain used on the trailer must meet or exceed the values listed for the maximum gross trailer mass or aggregate trailer mass as indicated in Table 3.2.

**Table 3.2 Safety chain size selection**

Vehicles manufactured before 1 July 1998		
Gross trailer mass (tonnes)	Chain size (mm)	Minimum chain breaking load (tonnes)
2.5–4.27	7.1	6.4
4.27–7.5	9.5	11.6
7.5–13.5	12.7	20.4
13.5–21.5	15.9	32.0
21.5–30.0	19.0	46.4
>30.0	22.0	63.2
Vehicles manufactured from 1 July 1998 to 31 December 2008		
Aggregate trailer mass (tonnes)	Chain size (mm)	Minimum chain breaking load (tonnes)
Over 3.5 and up to 4.3	7.1	6.4
Over 4.3 and up to 7.5	9.5	11.6
Over 7.5 and up to 13.5	12.7	20.4
Over 13.5 and up to 21.5	15.9	32.0
Over 21.5 and up to 30.0	19.0	46.4
Over 30.0	22.0	63.2

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Vehicles manufactured before vehicles manufactured from 1 January 2009

Aggregate trailer mass (tonnes)	Chain size (mm)	Minimum chain breaking load (tonnes)
Over 3.5 and up to 5.0	6	5.1
Over 5.0 and up to 8.0	8	8.2
Over 8.0 and up to 12.5	10	12.8
Over 12.5 and up to 21.5	13	21.7
Over 21.5 and up to 32.5	16	32.8
Over 32.5	19	46.5

### Arrangement of chains

Safety chains must be arranged so that:

- The chains are attached to the trailer
- the chains are crossed to support the drawbar and prevent from dropping to the ground in the event of coupling failure or disconnection
- The points of attachment to both the towing vehicle and the trailer must be as near as practicable to the coupling and arranged so as to maintain direction of the trailer in the event of coupling failure or disconnection.

Ensure that the attachment fittings do not foul on the rear of the towing vehicle or trailer drawbar under any possible operating conditions.

### Attachment of chains

Safety chains must be attached so that:

- the attachments to the towing vehicle and the trailer are capable of withstanding the specified breaking load of each chain

**Shackles are not permitted.**

**Ramshorn type hooks are not permitted.**

Chain coupling attachment bracket and dimensional recommendations appear in Table 3.3.

- the attachments to the towing vehicle and the trailer are separate from the coupling and its fasteners
- any safety chain attachment point affixing a safety chain to a drawbar must be located as near as practicable to the coupling. Where two points of attachment are required they must be mounted one on either side of the centreline of the drawbar
- the chain and coupling links are NOT WELDED, DEFORMED OR ELECTROPLATED subsequent to its manufacture.

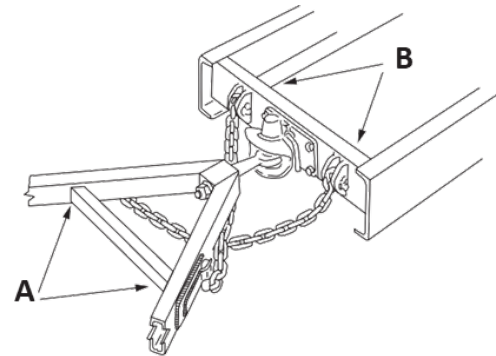
### Chain attachment brackets

The dimensions and configurations of typical chain retention brackets are shown in the following table and diagram:

Table 3.3 Typical bracket dimensions

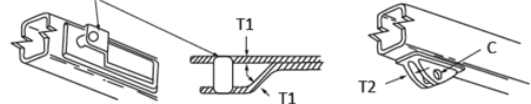
Minimum Chain(mm)	Minimum length of fillet weld			Bracket dimensions		
	Size length	(T1)	(T2)	(B)	(C)	(D)
9.5	6 x 200	16	16	4 x M12	19	*
12.7	6 x 360	20	20	4 x M16	25	*
15.9	8 x 420	25	20	4 x M20	32	*
19.0	10 x 480	25	25	4 x M20	38	*

\* Dimension 'D' to suit coupling link plus minimum clearance to prevent binding.



#### A. To the trailer

Pin welded to prevent chain loss



#### B. To the towing vehicle

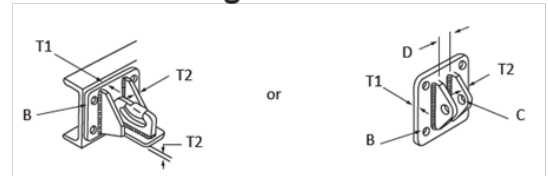


Figure 3.6 Typical attachment of chains

### 3.5.3. Attachment pins

All pins used to connect safety chains to trailers and towing vehicles must be manufactured from steel bar with a minimum specification of 4140 or 4150 grade (Ultimate tensile strength 1040MPa) unless otherwise approved.

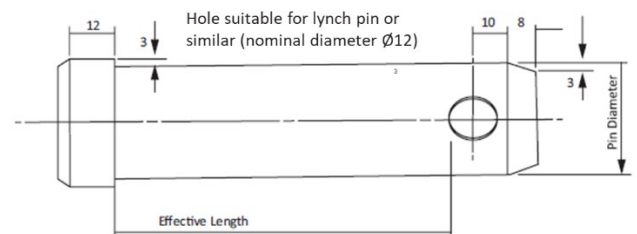


Figure 3.7 Typical pin design

Material – Steel 4140 (Alternative 4150)

– Ultimate tensile strength – 1040MPa

Standard agricultural 3-point linkage pins are NOT suitable because they are manufactured from a lower grade of steel and will not meet the load requirements. It is acceptable to use a metric class 10.9 bolt of the correct diameter providing that the threaded portion of the bolt is clear of the brackets.