

Light Vehicle Inspection Manual

Section 2 Brakes

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Australian Design Rules relevant to this section

ADR 31/...	Vehicle markings
ADR 33/...	Hydraulic brake systems for passenger cars
ADR 35/...	Commercial vehicle brake systems
ADR 38/...	Trailer brake systems
ADR 42/...	General safety requirements
More information	Appendix A – Brake Drums and Discs - Minimum Material Thickness

OBJECTIVE: To ensure that the brakes operate effectively and are correctly adjusted.

2.1. Check the operation of the brake controls

Reasons for rejection

- a) On rubber faced brake pedals, any metal is showing.
- b) On metal brake pedals, there is no anti-slip surface.
- c) Missing or broken brake pedal or handle, or associated components.
- d) Brake pedals or handles are broken or missing or are outside the scope of manufacturer's original design.
- e) When the service brakes are firmly applied, less than 20% of the pedal travel remains (unless within manufacturers limits).
- f) When steady moderate pressure is applied to the service brake pedal for 10 seconds, the pedal travels towards the floor or the brake failure indicator light comes on.
- g) Where ADR 31 or 35 applies, the brake failure warning light does not operate when the ignition is turned 'on', before the engine is started.
- h) Any park brake handle or control lever is not fitted with a locking device capable of holding in any position.
- i) When not in use, any brake lever, handle or pedal does not return to the fully released position.
- j) Where ADR 31 applies, the park brake warning lamp does not operate when the ignition is 'on' and the parking brake is applied.
- k) The brake controls, when operated, do not cause the corresponding brake to operate (with the engine running, if necessary).
- l) If a vehicle manufactured from 1 July 1988 is fitted with an 'antilock system' (ABS) and the antilock warning lamp does not illuminate when the ignition is switched on and the antilock warning lamp extinguishes after the static check period, or the vehicle reaches 10km/hr.

- m) Where a vehicle manufactured from 1 November 2011 that is fitted with an Electronic Stability Control system (ESC), the ESC malfunction tell-tale lamp doesn't:
- Illuminate when the ignition is switched to the on position; and
 - Extinguish after the check period; and
 - Illuminate with the word 'OFF' below the ESC symbol when the ESC is switched off.

2.2. Inspect the condition of visible brake components

Reason for rejection

- a) Brake pipes, hoses and connections are damaged, severely deteriorated, not securely mounted, cracked, broken, kinked, crimped, damaged by heat or have visible signs of leakage, swelling or bulging.

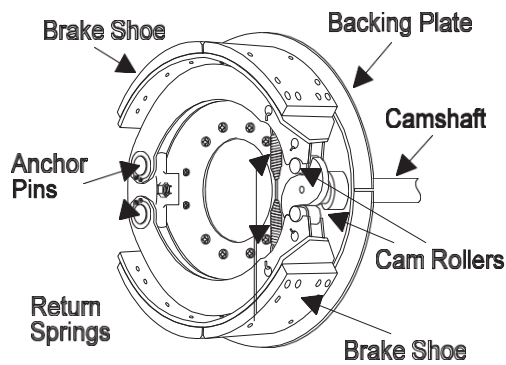
Note: i. *For example, the reinforcement fabric is exposed or the hose swells or bulges when the brakes are applied. Minor cracking or splits in the outer casing are not a reason for rejection but should be brought to the attention of the owner.*

- b) Where visible, any brake component is missing, broken, modified, excessively worn, inoperative, leaking, and contaminated or is not securely mounted.

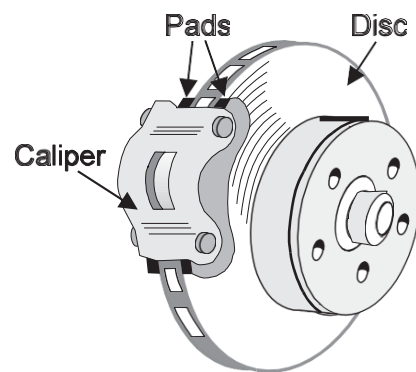
Note: ii. *Use manufacturer's limits for assessing wear in components*

- c) Any hydraulic brake hose is of insufficient length to allow for the full range of steering and suspension movement, or is twisted.
- d) Hydraulic lines are not constructed of approved material.
- e) Any braided hydraulic brake hose that is not marked with the manufacturer's name and compliance with a SAA, SAE, BS, JIS, DIN, ISO or ECE standards for flexible brake hoses.
- f) Hydraulic pipes or hoses are not manufactured, repaired and marked to relevant Australian Standards (or equivalent).
- g) Hydraulic pipes are repaired by heating or welding.
- h) The level of brake fluid is below the minimum indicated level.
- i) Where visible, the brake lining material, at any point, is worn to less than manufacturer's limits or if the limits are not known; 0.8mm above bonded shoe or pad mounting surface and level with the rivet or bolt heads on riveted or bolted linings.
- j) It is evident that any power/vacuum assistance for the brakes is not operating or compressors, vacuum pumps, pulley belts are loose, cracked or worn.
- k) Evidence of brake fluid leaking from any component, joint or seal.
- l) Where ADR 42 applies, any brake hose is not marked with manufacturer's name.

- Note:**
- iii. Threaded bosses used for braking component mounting must have full depth thread engagement of at least the bolt diameter.
 - iv. The use of copper pipe for hydraulic brake pipe is not allowed.
 - v. Hydraulic brake hoses fitted to vehicles that are required to comply with ADR 7, 7/00 or 42/04 should be manufactured to SAE J1401 or equivalent. Flares for tubing should be in accordance with SAE J5336 or equivalent.
 - vi. Joining hydraulic brake pipes by brazing, silver soldering, etc. is not allowed.



Drum brake components



Disc brake components

Figure 2.1 Brake Components

2.3. Brake testing with a roller brake tester

Note: vii. This section should be read in conjunction with the equipment manufacturer's instructions.

Using a roller brake tester, check the retardation forces on each wheel. Release all brakes, place transmission in 'neutral' (not 'park' for automatic transmission) and slowly apply a braking force until a maximum force is attained, or wheel slip occurs.

Reasons for rejection

- a) There is more than 30% difference in the brake force between the wheels on any axle.
- b) The minimum brake force on any wheel is less than the performance requirement specified in **Table 2.1 Minimum Brake Force**.
- c) With the brakes released, the average brake drag is more than the performance requirement specified in **Table 2.2 Maximum Brake Drag**.
- d) The parking brake does not give a reading, or the vehicle does not lift out of the roller.

Table 2.1: Minimum Brake Force

TYPE OF VEHICLE	kN (minimum)
Less than 2.5 tonnes tare	2.0
2.5 tonnes or over	3.0

Table 2.2: Maximum Brake Drag

TYPE OF VEHICLE	kN (maximum)
Less than 2.5 tonnes tare	0.5 drive axle 0.25 other axle
2.5 tonnes or over	1.0 drive axle 0.5 other axle

Note: viii. *On some light vehicles the brake force limit might not be reached as the vehicle will be lifted out of the rollers. Similarly, it might not be reached if a load proportioning valve is fitted to the rear axle. In both cases it is considered a pass if the brake balance is within the specified limit.*

2.4. Service brake test with a decelerometer

Set up a suitable decelerometer in the vehicle cabin. With the vehicle unladen, drive it to at least 30 km/h. Put the transmission into neutral. With both hands on the steering wheel, bring the vehicle to a halt as rapidly as possible in a safe manner with one sustained and smooth braking action using the service brakes.

- Note:**
- ix. Ensure the brake test area is suitable and safe – see **Section 2.6 Road testing of service brakes**.
 - x. This section should be read in conjunction with the equipment manufacturer's instructions.
 - xi. Decelerometer standards should be read in conjunction with the equipment manufacturer's specification.
 - xii. On some vehicles with light axle loads, or when testing in wet weather, it might be difficult to obtain a brake test result because of wheel lockup. In these cases the pedal pressure should be reduced to a point where only the minimum specified deceleration rates are achieved.

Reasons for rejection

- a) The application of the brakes causes the vehicle to swerve from a straight line path.
- b) For vehicles built after 1930, the service braking system decelerates the vehicle at less than the performance requirement specified in **Table 2.3 Service Brake Performance**.
- c) Pedal force exceeds 885N.

Table 2.3 Service Brake Performance (vehicles built after 1930)

Brake Requirement	Vehicle Category	AVERAGE		PEAK	
A	Gross Mass Less than 2.5 tonnes	3.8 m/s ²	39%g	5.8 m/s ²	60%g
B	Gross Mass 2.5 tonnes or over	2.8 m/s ²	29%g	4.4 m/s ²	45%g

- Note:**
- xiii. Some decelerometers require a weight category to be selected, the categories shown in the first column equate to the brake requirements A & B.
 - xiv. The deceleration values in **Table 2.3 Service Brake Performance** are intended to cover a wide range of vehicles including some older vehicles with outdated braking systems. Vehicles with modern braking systems, such as those designed to comply with ADR 31, should be able to achieve much higher decelerations than those prescribed in the Table. If a modern vehicle is found to only just comply with the prescribed values then the owner should be informed that the brakes are likely to be in need of maintenance.
 - xv. For vehicles built before 1930 no service brake performance requirements apply but the on-road brake test should be conducted to assist in determining whether a brake maintenance problem exists - such problems should be followed up by visual inspection of the brake components.

2.5. Brake testing with a skid-plate tester

Note: xvi. *This section should be read in conjunction with the equipment manufacturers' instructions.*

 xvii. *Ensure the brake test area is suitable and safe – see **Section 2.6 Road testing of service brakes.***

Using a skid-plate tester, check the deceleration rates and retardation forces on each axle. Drive the vehicle to the speed nominated by the equipment manufacturer and the transmission into "neutral". Bring the vehicle to a halt as rapidly as possible with one sustained braking action.

Reasons for rejection

- a) There is more than 30% difference in the brake force between the wheels on any axle.
- b) The service braking system decelerates the vehicle at less than the performance requirements specified in **Table 2.3 Service Brake Performance.**
- c) Where ADR 31 and 35 does not apply, the parking brake decelerates the vehicle at less than the performance requirements specified in **Table 2.5 Parking Brake Performance.**
- d) Where ADR 31 or 35 applies, the parking brake does not provide any retardation.

2.6. Road testing of service brakes

Use a suitable area with a hard level surface, which is free from gravel or other loose material. The area must be at least 350 metres long for testing of heavy commercial vehicles, or at least 100 metres long for testing of all other vehicle classes. Drive the vehicle to at least 35 km/h. Put the transmission into neutral. With both hands on the steering wheel, bring the vehicle to a halt as rapidly as possible in a safe manner with one sustained and smooth braking action using the service brakes.

Reasons for rejection

- a) The application of the brakes causes the vehicle to swerve from a straight line path.
- b) For vehicles built after 1930, the service braking system fails to bring the vehicle to a stop within the distance specified in **Table 2.4 Road Test of Service Brake Performance**;

Table 2.4 Road Test of Service Brake Performance (vehicles built after 1930)

Brake Requirement	Vehicle Category	Distance
A	Gross Mass Less than 2.5 tonnes	12.5 m
B	Gross Mass 2.5 tonnes or over	16.5 m

- Note:**
- xviii. *The maximum stopping distances in **Table 2.4 Road Test of Service Brake Performance** are intended to cover a wide range of vehicles including some older vehicles with outdated braking systems. Vehicles with modern braking systems, such as those designed to comply with ADR 31, should be able to achieve much higher decelerations and shorter stopping distances than those prescribed in the Table. If a modern vehicle is found to only just comply with the prescribed values then the owner should be informed that the brakes are likely to be in need of maintenance.*
 - xix. *For vehicles built before 1930 no service brake performance requirements apply but the on-road brake test should be conducted to assist in determining whether a brake maintenance problem exists - such problems should be followed up by visual inspection of the brake components.*
 - xx. *If road testing alone is the only method of brake assessment to be used then brake linings must also be inspected (i.e. wheels and brake drums removed).*

2.7. Parking brake test for vehicles not designed to ADR 31, ADR 35 or vehicles not fitted with a tandem master cylinder/dual circuit brakes

Where a decelerometer is used, drive the vehicle to at least 15 km/h. Put the transmission into neutral. Bring the vehicle to a halt as rapidly as possible in a safe manner with one sustained and smooth braking action using the parking brake.

Reason for rejection

- a) The parking brake decelerates the vehicle at less than the performance requirement specified in **Table 2.5 Parking Brake Performance**.
- b) Where a decelerometer is not used, the parking brake does not hold the vehicle stationary on a 12% gradient.

Table 2.5 Parking Brake Performance

Brake Requirement	Vehicle Category	AVERAGE		PEAK	
A	Gross Mass less than 2.5 tonnes	1.6 m/s ²	16%g	1.9 m/s ²	20%g
B	Gross Mass 2.5 tonnes or over	1.1 m/s ²	11%g	1.5 m/s ²	15%g

Note: *xxi. Some decelerometers require a weight category to be selected, the categories shown in the first column equate to the brake requirements A & B.*

2.8. Parking brake test for vehicles designed to ADR 31, ADR 35 or vehicles fitted with a tandem master cylinder/dual circuit brakes

Apply the park brake and attempt to drive off using a light throttle.

Reason for rejection

- a) The parking brake does not hold the vehicle stationary.