

Additional Information About Trailer Brake Couplings

Another factor that can limit the towing rating of a motor vehicle is the provision of trailer tow couplings. A trailer that has an Aggregate Trailer Mass over 4.5 t must have a service brake system that operates on all the trailer wheels. The trailer service brake system must be capable of being actuated from the towing vehicle via a control coupling. Hence, a motor vehicle that has a tow rating greater than 4.5 t must provide a service brake connection; or so it would seem!

ADR 35 requires that a motor vehicle with a towing rating over 4.5 t must be certified to comply with the brake compatibility limits that are in the brake rule (ADR 35/03 Figure 1). The test is to be done with the vehicle laden to GVM. However, the rule does not mandate provision of trailer service brake.

The requirements in ADR 35/03 are:

- 4.1.10. Where the vehicle has a '*Rated Towing Capacity*' of more than 4.5 tonnes, either:
 - 4.1.10.1. the vehicle must have certification which provides for the operation of trailer brakes using air at a positive pressure as described in clause 4.1.9 or
 - 4.1.10.2. the '*Manufacturer*' must supply to the '*Administrator*' sufficient data to allow the vehicle's '*Service Brake System*' to be modelled under laden braking conditions. Provision of the data derived from the tests performed as described by clause 7.13.2 will be considered as sufficient to meet the requirements of this clause.
 - 4.1.10.3. Where the vehicle is a variant of a previously tested vehicle and the effects of the changes on braking performance are known by a test conducted on a complete vehicle, a component or a sub-assembly of components, the requirements of this clause can be met by '*Approved*' calculations.
- 4.1.11. Where the '*Service Brake System*' incorporates a single '*Brake Power Unit 35/...*' an '*Audible Indicator*' must be provided which must operate at all times when the service brake failure '*Visible Indicator*' operates as specified in clause 4.2.
- 4.1.12. Each air reservoir in a compressed air '*Brake System*' must be fitted with a manual condensate drain valve at the lowest point. An automatic condensate valve may be fitted provided it also drains the lowest point. The manual drain valve may be incorporated in the automatic valve.
- 7.13.2. For the purposes of clause 4.1.10.2, where the vehicle has a '*Rated Towing Capacity*' of more than 4.5 tonnes and the '*Manufacturer*' elects not to provide certification which provides for the operation of trailer brakes using air at a positive pressure, the response of the '*Service Brake System*' must be characterized as follows. The vehicle must be laden to the Group '*Axle Load*' limits as specified in Table 2 or the manufacturers '*GVM*' whichever is the lesser, and a series of tests conducted braking the vehicle to a stop from initial speed of 60 km/h. The output energy level of the '*Service Brake System*', '*Control*' and the '*ERC*' achieved must be recorded for each test. For the first test an '*ERC*' in the range 0.05 to 0.1 must be achieved. Subsequent tests must be conducted increasing the '*ERC*' in not less than 5 evenly spaced steps until an '*ERC*' of not less than 0.45 is reached.

Note that Clause 7.13.2 of ADR 35/03 makes it clear that the ‘Manufacturer’ need not provide the trailer air couplings; indeed the trailer can have electric brakes rather than air brakes. ADR 35/03 is not prescriptive about the technology used to achieve the service brake performance or the trailer brake connections.

Vehicle manufacturers sometimes give a vehicle a towing rating greater than 4.5 t without providing trailer brake couplings. However, they are required to provide evidence to the Administrator that the vehicle meets the compatibility requirements.

The relevant sections in the trailer brake rule (ADR 38/04) are:

- 5. GENERAL DESIGN REQUIREMENTS FOR TRAILERS OVER 4.5 TONNES ‘ATM’**
- 5.1. A ‘*Service Brake System*’ must be fitted to all trailer wheels and be in accordance with the requirements of part 6.
- 5.2. The trailer ‘*Brake System*’ must be capable of being actuated from the towing vehicle by means of a connection between the trailer and towing vehicle with a performance not less than that specified for the ‘*Emergency Brake System*’ in part 7 after any one failure in a ‘*Brake Device*’ in the trailer ‘*Brake System*’.
- 6. SERVICE BRAKE SYSTEM**
- 6.1. The ‘*Service Brake System*’ must be designed so that the braking force can be progressively increased and decreased by means of the ‘*Control Signal*’ from the towing vehicle.
- 6.2. The combined total energy capacity of energy storage devices incorporated into the ‘*Service Brake System*’ must be not less than 8 times the combined maximum energy capacity of the service brakes actuating devices. In the case of compressed air ‘*Braking Systems*’, the ratio of air reservoir volume to actuator volume will be taken as being the ratio of energy capacity.

For light trailers the following excerpt from

http://www.infrastructure.gov.au/roads/vehicle_regulation/bulletin/vsb1/vsb_01_b.aspx#15

is useful:

15. Braking

15.1 Trailers that do not exceed 0.75 tonne GTM with a single axle

No brakes are required.

(For further information, refer to [ADR 38/02 clause 5](#))

Note

Two axles with centres spaced less than 1 metre apart are regarded as a single axle.

15.2 All other trailers that do not exceed 4.5 tonnes ATM

These trailers must be fitted with an efficient brake system that complies with ADR 38/-. Except for over-run brakes, all brakes must be operable from the driver's seat of the towing vehicle.

For trailers up to 2 tonnes GTM, an efficient braking system is considered to have brakes operating on the wheels of at least one axle. Over-run brakes may only be used on trailers that do not exceed 2 tonnes GTM.

Every trailer over 2 tonnes GTM must have brakes operating on **all wheels**. The brake system must cause immediate application of the trailer brakes in the event of the trailer becoming detached from the towing vehicle. Under these circumstances, the brakes must remain applied for at least 15 minutes.

All flexible hydraulic brake hoses, air or vacuum brake tubing and air and vacuum flexible hoses must conform to SAA, SAE, BS, JIS, DIN, ISO or ECE Standards and be fitted to the vehicle in a way that will prevent chafing, kinking or other mechanical damage under normal motion of the parts to which they are attached.

Note that GTM is Gross Trailer Mass, which is the total engineering rating of all the axles, taking account of the tyre ratings. GTM can never exceed the ATM. Most small trailers have a rigid drawbar which imposes load onto the towing vehicle. There is no statutory limit on how much vertical weight can be imposed onto a towing vehicle. As a guide, a light trailer might have $ATM - GTM < 1000 \text{ kg}$.

So, a trailer with a Gross Trailer Mass in the range 750 kg – 2 t is required to have a service brake system, which can operate by over-ride forces. Hence a trailer service brake coupling is not required.

A trailer that has a $GTM > 2t$ is required to have a service brake and an emergency brake. These brakes cannot operate by over-ride forces. Therefore, the towing vehicle must have a service brake control coupling and the trailer must have a source of energy that operates the emergency brake in the event of separation. Often the service brakes are electric and the control coupling is a graduated electrical signal that is provided in the auxiliary pin of the usual electrical trailer connector.

It is common for medium duty vehicles (categories NA and NB1) to have a towbar installed. The towbar is often rated well above the 3.5 t limit that applies to 50 mm towballs. The motor vehicle will also often have a towing

rating well above 3.5 t. These vehicles should be provided with service brake control coupling which can take the form of an electric brake controller.

In summary:

- ADR 38/04 (trailer brake rule) does require that a trailer with an Aggregate Trailer Mass (ATM) over 4.5 t must have a service brake that is controlled from the towing vehicle. That is, the trailer must have brake couplings and cannot rely upon over-ride brakes.
- ADR 35/03 (motor vehicle brake rule) does not mandate the provision of a trailer service-brake control coupling even when the towing rating is greater than 4.5 t.
- ADR 35/03 (motor vehicle brake rule) does require that the motor vehicle manufacturer has provided evidence to the Administrator that the vehicle complies with the brake compatibility limits (at GVM).
- None of the rules mandate the technology that is used to achieve trailer service brake control. Therefore, air, vacuum, hydraulic or electrical brake systems could be used on the trailer. It is the service brake performance level that is mandated. Further, the trailer must have an emergency (break-away safety) brake that will hold the trailer for 15 minutes.
- Despite the rules not mandating the provision by the manufacturer of a trailer service brake coupling, a vehicle that has a towing rating exceeding 2 tonne should have either an electric or air pressure trailer brake coupling that provides a graduated brake signal level.
- A trailer that has a GTM rating exceeding 2 tonne must have a service brake and an emergency brake. The service brake must be controlled via a connection to the towing vehicle.

It is also relevant to observe that ADR 35 does not mandate the provision of a trailer ABS connector even when the motor vehicle has ABS brakes.

Despite the fact that ADR 35 does not mandate provision of trailer service brake (or ABS) couplings, it is a reasonable expectation that the vehicle manufacturer will have a design that dealers or operators could implement to provide these couplings.

If the brake couplings are installed by the manufacturer's dealer, the Administrator would probably assess that the installation was done with the manufacturer's oversight. That is, the work would be covered by the compliance plate approval. If the manufacturer cannot provide a detailed design for the installation of the couplings, or if they are installed after the vehicle has been used for its intended purpose, then an engineer's approval certificate will be required.

For motor vehicles that do have air-brake trailer couplings, the design must cause the supply line pressure to have to a low level (< 35 kPa) when the motor vehicle is parked. This requirement however, does not prevent the service brake control line being pressurized when the motor vehicle is

parked. Note that it is European practice to park trailers on the service-brake control air pressure even though the trailer has spring parking brakes. The European trailer spring-brakes operate purely as an emergency safety brake.