

MEDIUM ARTICULATED VEHICLES TOWING A TRAILER



A **Medium Articulated Vehicle towing a Dog Trailer** (commonly known as a MAD) and a **Medium Articulated Vehicle towing a Pig Trailer** (MAP) meet the definition of road train under the *Heavy Vehicle National Law* (HVNL) and is a Type 1 road train as its overall length is less than 36.5m.

MAD's and MAP's were first approved for use in South Australia in 1985, as a productivity initiative to provide improved access to the West Coast of South Australia, where road train access was not widely available on Council roads.

Research and on-road trials undertaken in the early 2000's in relation to the dynamic performance of these vehicles identified stability issues that affected their performance; because of these issues the Department introduced minimum specifications for these combinations to maintain safe operation.

A subsequent review of the operation of MAD and MAP combinations undertaken in 2010 introduced additional vehicle specifications and operating conditions for conforming MAD combinations and phased out the operation MAP combinations from January 2012, with no new MAP combinations being approved.

What type of MAD combinations can operate in South Australia?

There are two different types of MAD combinations that have been approved to operate in South Australia these are described as conforming and non-conforming.

Conforming MAD

A conforming MAD complies with all vehicle specifications and mass limits outlined in this fact sheet, is not more than 25.0m in length and operates in the following configurations:

- **MAD (Type 1)** – is a combination consisting of a prime mover towing a tri-axle semi-trailer where the semi-trailer is connected to the prime mover by a fifth wheel coupling and towing a 3-axle dog trailer; and
- **MAD (Type 2)** – is a combination consisting of a prime mover towing a tandem axle semi-trailer where the semi-trailer is connected to the prime mover by a fifth wheel coupling and towing a 4-axle dog trailer.

Non-conforming MAD

A non-conforming MAD combination does not comply with the suspension requirements in this fact sheet (the trailers are fitted with air suspension as opposed to mechanical spring packs). The dynamic testing of these combinations where the trailers are fitted with air suspension found that they had poor on-road performance and as a result the Department ceased to provide approval for permits for new combinations from 2012.

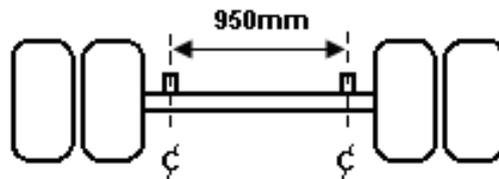
Permits issued to combinations that were approved prior to this date will be honoured (including renewals) until such time as the combination ceases to operate. No new non-conforming MAD requests will be accepted.

Conforming MAD vehicle specifications

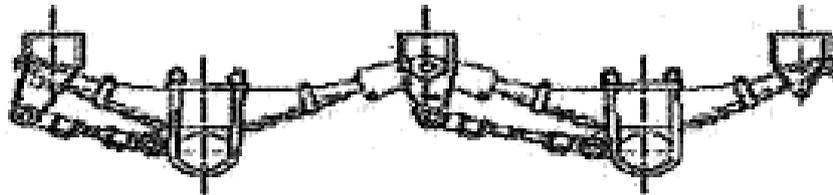
In order to operate on approved routes in South Australia a conforming MAD must comply with the vehicle specifications, dimensions, mass limits and axle spacings outlined below. These requirements are designed to ensure the safe operation of the vehicle and optimise performance on the road network.

Trailer Suspension

- Trailer suspension must be the mechanical spring type with a roll gradient of not less than 2.1 degrees/g (degrees of body roll per g of lateral acceleration).
- Suspension to be over-slung with a spring pressure rate of not less than 2.2kN/mm and lateral spring spacing (centre to centre across the axle) of not less than 950mm.



Note: The suspension roll gradient and spring rate can be provided by the suspension manufacturer.



'Over-slung Suspension' configuration consists of the axles bolted underneath the leaf springs.

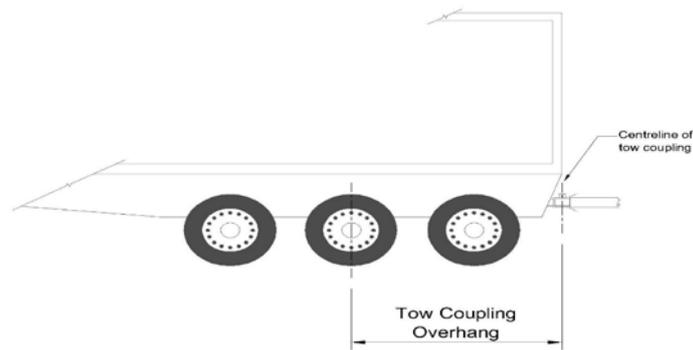
Mechanical Spring Packs

Trailers are to be fitted with any of the spring packs which are specified in the table below:

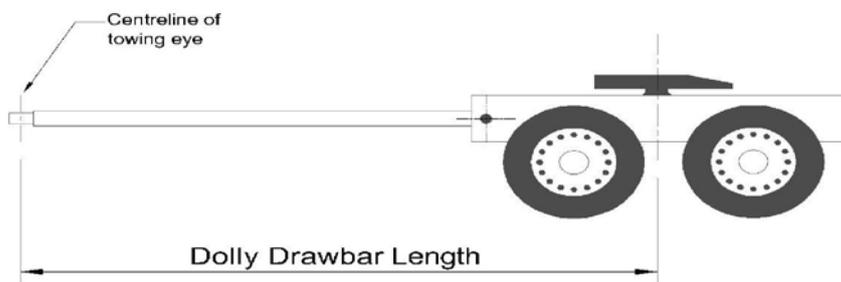
No. Spring Leaves	Spring Width (mm)	Spring Thickness (mm)
8	75	13
9	75	13
10	75	16
3	75	20
8	90	10
9	90	10

Note: These specifications were established as a result of on-road performance testing.

Tow couplings and Drawbar length



'Tow Coupling Overhang' is defined as the distance between the centre of the tow coupling and the centre of the axle group of the semi-trailer.



'Drawbar Length' is defined as the distance from the centre of the towing eye to the centre of the axle group on the dolly.

Dimension Limits

MAD combinations must not exceed the dimension limits specified in the table below:

Detail	Dimension
Maximum overall length	25.0 metres
Difference in length of the two trailers must not exceed	3.0 metres
Maximum height of sideboards of trailers from the ground must not exceed	3.2 metres (unladen at initial inspection)
Tow coupling overhang must not exceed	1.9 metres from the centreline of the tri-axle group of the front trailer, or 1.2 metres from the centreline of the tandem axle group of the front trailer
Drawbar length must not be less than	4.0 metres

Axle Spacings

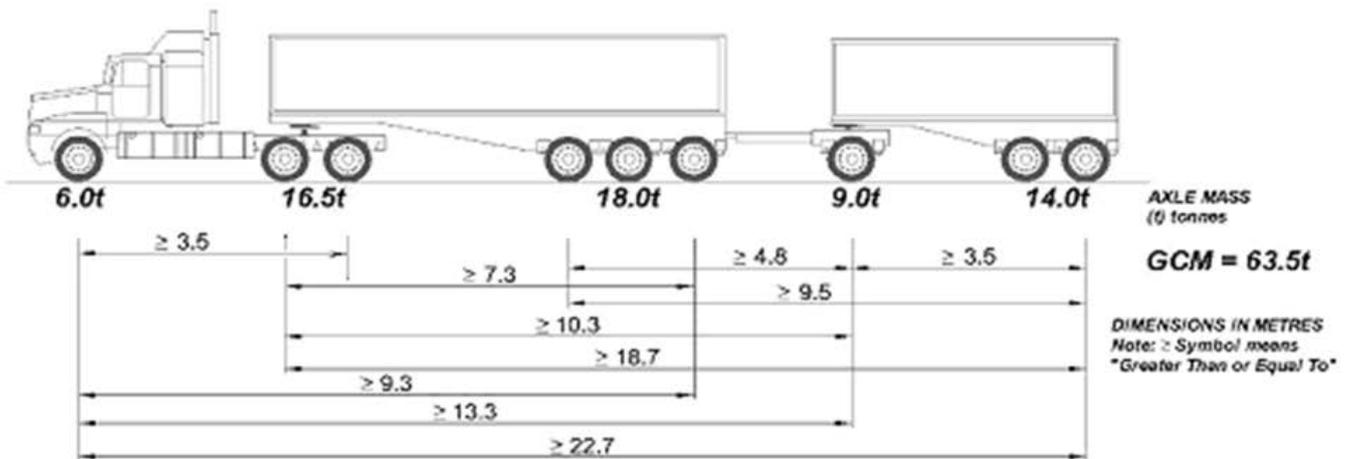


Figure 1: Conforming MAD - Type 1 (Medium Articulated Vehicle with a 3 axle dog trailer)

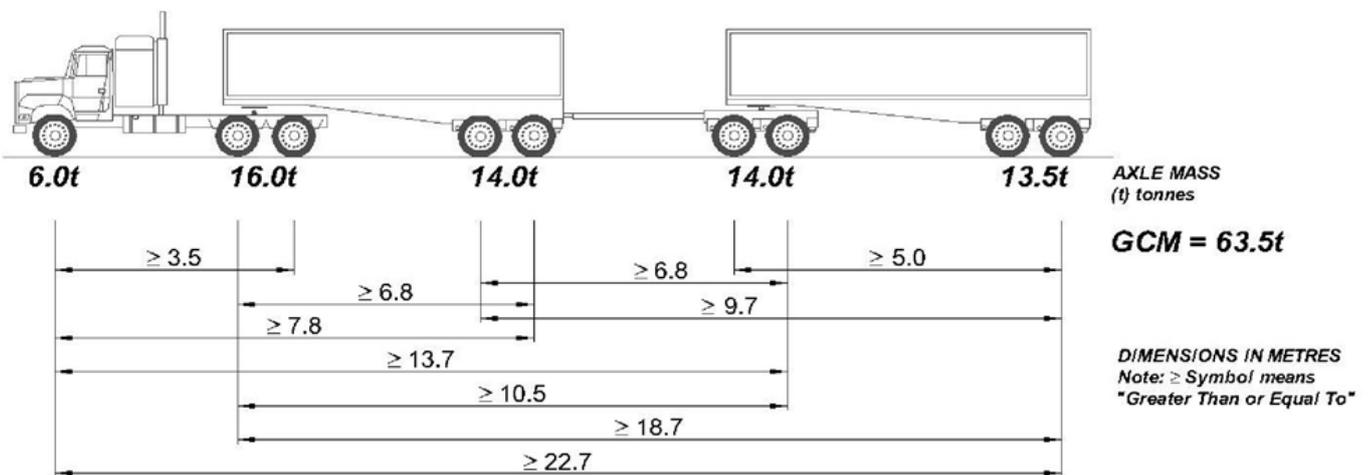


Figure 2: Conforming MAD - Type 2 (Medium Articulated Vehicle with 4 axle dog trailer)

Mass Limits

MAD Type 1	GML	MAD Type 2	GML
Steer Axle	6.0t	Steer Axle	6.0t
Drive Axle	16.5t	Drive Axle	16.0t
Front Axle Trailer	18.0t	Front Axle Trailer	14.0t
Dog Trailer (3-axle dog trailer front axle)	9.0t	Dog Trailer (4 axle dog trailer front axle)	14.0t
Dog Trailer (3-axle dog trailer rear axle group)	14.0t	Dog Trailer (4-axle dog trailer rear axle group)	13.5t
GCM	63.50t	GCM	63.50t
Unladen mass of the whole combination not to exceed	21.0t	GCM	N/A

Note: As this combination does not comply with the axle spacings in the *Heavy Vehicle (Mass, Dimension and Loading) National Regulations* it is not eligible to operate at prescribed mass limits on all of its axles or at Higher Mass Limits.

What is required to obtain approval to operate a MAD in South Australia?

- The prime mover must be registered using the configuration code MU3
- A MAD can only operate in South Australia under a permit issued by the National Heavy Vehicle Regulator (NHVR), the permit may be issued for up to three (3) years
- An application for a permit must be accompanied by a line drawing that details the dimensions of the combination and spacing between all of the axles.

Operating conditions for MADs.

- While operating as a MAD the semi-trailer must be fully laden before any load is imposed on the dog trailer
- Conforming MADs will be restricted to a maximum speed limit of 90km/h except where a traffic sign indicates a lower speed limit
- Non-conforming MADs will be restricted to a maximum speed limit of 80km/h except where a traffic sign indicates a lower speed limit
- A "LONG VEHICLE" sign must be displayed at the rear of the vehicle combination and be clearly visible to other road users

Approved routes or areas

- A MAD combination that is up to 25 metres in length can travel on the network titled '26m B-Double (GML)' as published on the South Australia mapping system RAVnet.

Note: Route network maps can be found on the [RAVnet website](#).

What documents do I need to use and carry?

The operator of a MAD must carry the permit issued by the NHVR.