Vehicle Standards Guide (VSG-16) – 50mm ball couplings

Frequently Asked Questions

This document answers some frequently asked questions arising from the publication of VSG16 regarding the installation and use of 50mm ball couplings on heavy vehicles with a gross vehicle mass (GVM) of more than 5000kg.

The 50mm ball coupling type is designed for use on light vehicles and are the most common type of tow coupling installed on light vehicles and trailers. Due to the common need for heavy vehicles to tow light trailers, these type of tow couplings are also regularly fitted to heavy vehicles.

This document refers to the use of these 50mm ball couplings when used as part of a heavy vehicle combination—that is, a heavy vehicle is used to tow a light trailer.

Under ADR 62/.., 50mm ball couplings intended for towing trailers with an Aggregate Trailer Mass (ATM) of up to 3500kg must comply with the design, construction, dimensions, strength, and testing requirements as detailed in *Australian Standard AS 4177* (the Standard).

Who does this impact?

- Vehicle modifiers and approved vehicle examiners (AVEs) who certify or install 50mm ball coupling components.
- Anyone who uses a 50mm ball coupling in a heavy vehicle combination, including:
  - motorhomes (when used as a towing vehicle)
  - light trailers including caravans (when towed by a heavy vehicle with a GVM over 5000kg)
  - tow trucks used in the recovery of light trailers (including caravans).

What has changed?

There have been no significant updates to the standard since 2004. In 2004, the standard was changed to clearly state that 50mm ball couplings were only suitable for use on vehicles with a GVM not exceeding 5000kg.

During a previous review of the *Vehicle Standards Bulletin 6 (VSB6): National Code of Practice for Heavy Vehicle Modifications*, the NHVR became aware of confusion regarding the above requirements.

What is the NHVR doing about it?

The NHVR understands that 50mm ball couplings are commonly installed on heavy vehicles to allow the vehicle to tow light trailers.

The NHVR does not object to 50mm ball couplings being installed on motor vehicles with a GVM of more than 5000kg, provided the necessary calculations are performed to determine the reduced capacity of the coupling.

The NHVR has developed a *Vehicle Standards Guide (VSG16)* covering this topic to help explain the issues, the calculations needed, and what is happening. This guide is available on the NHVR website at: VSG16 - 50mm ball couplings (PDF, 297KB).

What is the actual issue?

Heavy vehicles are rated to their maximum towing capacity. This value is calculated based on the specifications of the vehicle in isolation. By contrast, the rating given to a tow coupling is based on the mass of the towing vehicle and the mass of the trailer in combination.

The rating given to a tow coupling is called a D-value and reflects the maximum force that can safely be imposed on that component.

A 50mm ball coupling is designed to have a D-value based on a maximum towing vehicle mass of 5000kg and a maximum trailer mass of 3500kg.

Increasing the mass of either of the vehicles in the combination will change the force imposed on the couplings, in turn changing the required D-value rating of the component.

What does this mean?

This means that although the rating of each component in the combination may be compliant individually, when used in combination, the resulting forces may exceed the D-value rating of the tow coupling. Exceeding the D-value of the tow coupling can result in component failure, causing the trailer to become disconnected from the towing vehicle.

For example, the 50mm ball coupling on a trailer rated to an ATM of 3500kg has a maximum D-value 20kN. When used in combination with a heavy vehicle with a GVM of 5000kg the resulting dynamic forces (and

therefore the required corresponding D-value) is approximately 20kN.

When the GVM of the towing vehicle is increased to more than 5000kg, the dynamic forces imposed on the exact same trailer coupling are increased because the heavier towing vehicle can impose more force on the coupling than a lighter vehicle. This causes it to exceed the D-value rating of 20kN. This makes the trailer coupling no longer suitable because of the increased risk of failure.

Additional care is also required when the ATM of the trailer is less than 3500kg. Trailers with a lower ATM may have a tow coupling with a lower D-value rating. A trailer with an ATM of 2000kg is only required to have a D-value rating of 14kN and a trailer with an ATM of 750kg need only have a tow coupling rated to 6.4kN.

Information about how to calculate the D-value of your specific combination is contained in VSG16.

What do I need to do?

If you install, modify, certify or drive a heavy vehicle fitted with a 50mm ball coupling, you must ensure the dynamic forces imposed do not exceed the D-value of the coupling.

Reducing the dynamic forces imposed on the tow coupling is achieved by reducing the mass of either the tow vehicle or the trailer. In most cases reducing the mass of the tow vehicle is not practical – when this occurs correct trailer selection is essential.

VSG16 provides the relevant formula and technical information required to calculate the reduced rating of the 50mm ball coupling or receiver that is fitted to a motor vehicle or trailer intended for use with a heavy vehicle.

➘ When calculating the tow limitations of a vehicle or combination, the tow capacity of a combination will always be limited by the lowest rated towing related component.

When changing the vehicles used in a non-compliant combination is not appropriate, changing the coupling type is the only way to achieve compliance.

What couplings can be used?

Where the required GVM and or ATM result in a D-value exceeds the limits of the 50mm ball coupling, changing the coupling type is the only option.

There are several alternative coupling types that may be used, including:

- pintle hook
- specialised four wheel drive couplings that have an appropriate rating and comply with ADR 62/..

It is advised that you discuss coupling options with the coupling manufacturers as well as an Approved Vehicle Examiner (AVE). An AVE is required to certify the installation of any new couplings on a heavy vehicle.

➘ Some pintle hook couplings are manufactured with a 50mm ball coupling incorporated into the design. In this instance, it is important to be aware that the 50 mm ball coupling part of the pintle hook has the same limitations detailed in this document, or the limitation may still be the rating of the trailer receiver.

Section P of the VSB6 relates to the fitting of tow couplings to heavy vehicles. It outlines minimum design, installation and performance requirements to select and mount tow couplings.

VSG16 provides more detailed information on the issues and what is happening.

Complying with the national heavy vehicle safety standards

The operator of a heavy vehicle must ensure that their vehicle complies with the *Australian Design Rules* (ADRs) and *Heavy Vehicle (Vehicle Standards) National Regulation*. Using or permitting another person to use a defective heavy vehicle on a road is an offence.

A defective heavy vehicle is a vehicle that either:

- does not comply with the heavy vehicle safety standards
- has a part that does not perform its intended function
- has deteriorated to an extent that it cannot be reasonably relied on to perform its intended function.

Penalties can include on-the-spot fines or prosecution. Formal warnings or a defect notice may also be issued. For more refer to the Heavy vehicle defects - https://www.nhvr.gov.au/hv-defects.

For more information:

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