

Section A
GENERAL



This document is published by the Commonwealth Department of Transport and Regional Services and relates to:

- demonstration of compliance with Australian Design Rules for heavy vehicles which have been modified prior to first sale; and
- acceptance by registering authorities of heavy vehicles which have been modified in service.

It is to be read in conjunction with Part B of this National Code of Practice - Sections and Modification Code - that covers requirements for individual vehicle systems.

HEAVY VEHICLE MODIFICATIONS**1. INTRODUCTION****1.1 Relationship with the Laws of Australian Jurisdictions**

Subject to Federal laws and the laws of the States and Territories of Australia, this document defines standards of practice in the design and manufacture of modifications to heavy vehicles. Other procedures are acceptable subject to adequate technical justification.

1.2 Effectivity Dates

This document is effective as at the date of issue or re-issue.

1.3 Administrative Requirements

It is intended that vehicles modified in accordance with this National Code of Practice will continue to comply with the national vehicle standards regulations and Australian Design Rules administered by the Commonwealth Department of Transport and Regional Services and the National Road Transport Commission.

While this Code of Practice establishes common technical standards, administrative responsibility for type certification and registration remains with the relevant Federal, State and Territory authorities.

2. BACKGROUND**2.1 Federal/State/Territory**

The *Motor Vehicle Standards Act 1989* came into effect on 1 August 1989. It made it an offence to modify a vehicle before it is first supplied to the market for use in transport (i.e. a new vehicle) in such a way as to make it 'non-standard', that is, no longer complying with the Australian Design Rules.

Because many heavy vehicles are modified following the placement of an identification plate (often referred to as a compliance plate) on the vehicle the States and Territories have developed procedures to control such modifications through a single, national code of practice that serves the requirements of both Federal and State/Territory authorities.

2.2 Future Developments

It is recognised that a code of practice that covers all eventualities is not feasible. Nor has every common modification yet been addressed. It has, nevertheless, been decided to re-issue this document establishing the overall safety requirements of heavy vehicle modifications and to document designs and procedures that are considered good practice. It is recognised that future developments will require further updates of this manual.

2.3 Manual Format

This updated manual has been produced only in electronic format and is available from the DoTaRS website.

2.4 Acknowledgments

The updated manual has been compiled by Queensland Transport and the Commercial Vehicle Industry Association of Australia.

HEAVY VEHICLE MODIFICATIONS**3. INTENT****3.1 Administrators**

The intent is to set down national technical requirements that provide the Administrator of Vehicle Safety Standards and Vehicle Registering Authorities in the States and Territories with an assurance that modifications to heavy vehicles result in:

- continuing compliance with the Australian Design Rules (ADR's) applicable at the vehicle's date of manufacture; and
- compliance with other requirements of all Registering Authorities; and
- minimum overall levels of vehicle operational safety.

3.2 Industry Organisations

This National Code of Practice is also intended to provide organisations that modify heavy vehicles with a set of frequently used procedures that, if followed, result in such modified vehicles being deemed to comply with the corresponding ADR's and other technical requirements. This does not, however, relieve an organisation from the responsibility of employing good technical and work practices.

4. SCOPE**4.1 Application**

This National Code of Practice applies to modifications to heavy vehicles both prior to their first sale in Australia (new vehicles) and after their first sale in Australia (vehicles in service).

For the purpose of this National Code of Practice, a heavy vehicle is defined as:

- a motor vehicle with a Gross Vehicle Mass (GVM) greater than 4.5 tonnes or,
- a trailer with an Aggregate Trailer Mass (ATM) greater than 4.5 tonnes.

This does not preclude the use of this Code of Practice for other categories of vehicle, where appropriate.

4.2 Range of Modifications Covered

This National Code of Practice provides detailed requirements and examples of acceptable practice for a range of common modifications. It supplements the recommendations of the original vehicle manufacturer in relation to vehicle modification techniques or standards and provides guidelines where manufacturer's standards do not exist. It is not intended to cover every eventuality.

4.3 Modifications or Practices Not Covered

It is recognised that some modifications may not be covered by this National Code of Practice. Similarly, practices other than those described in this document may be quite acceptable and, in some cases, more suitable. In these cases, a full engineering analysis by a suitably qualified person, supported by testing where appropriate, will be necessary before the modified vehicle is accepted.

HEAVY VEHICLE MODIFICATIONS**4.4 Precedence of ADR's and Manufacturer's Guidelines**

It is important to note that the requirements of the ADR's and the original manufacturer's modification guidelines take precedence over this National Code of Practice. Persons modifying or certifying modifications to heavy vehicles must ensure that all applicable manufacturer's recommendations are complied with and that no ADR compliance is invalidated, even as an unintended result of complying with this Code of Practice.

5. DEFINITIONS, ACRONYMS and ABBREVIATIONS

Appendix 1 shows definitions, acronyms and abbreviations that cover terms used in the sections in Part B of this Code of Practice. Two types are presented:

- definitions, acronyms and “abbreviations drawn from the *Third Edition Australian Design Rules for Motor Vehicles and Trailers*” (ADR's) and which are included for convenience as they may be referred to often in using the document; and
- definitions, acronyms and abbreviations which are not included in the (ADR's) definitions.

6. REFERENCED DOCUMENTS

Appendix 2 shows a list of documents that are referred to in the sections in Part B of this document. Before using each of these sections, persons modifying or certifying vehicles must have access to, and take account of, the requirements called up in these referenced documents. At the time of modification, the current standards must be utilised in the modification process.

7. OPTIONS - PROOF OF COMPLIANCE

This National Code of Practice requires that many sections must be treated in a particular manner for the purpose of demonstrating compliance with the various requirements. However, for a number of sections, compliance can be demonstrated in any one of several optional ways. These options typically include:

- acceptance of vehicle modified to the code requirements;
- approval from original manufacturer;
- calculation;
- physical test.

For each section in Part B, the allowable options for that particular modification type are defined.

8. OPERATING LIMITATIONS

Where a modification to a heavy vehicle results in a change to the permissible operating envelope of the vehicle, these limitations must be clearly defined in the modification documents. In addition, an insert for the operator's or driver's handbook must be prepared and delivered to the owner. Examples of changes to the operating envelope are:

- change to GVM, Gross Combination Mass and/or axle loading;
- requirement for maximum height of centre of gravity due to stability needs;
- crane operating limitations;
- body size limitations;
- speed limitations.

HEAVY VEHICLE MODIFICATIONS

9. RETENTION OF RECORDS

Complete records, including drawings, calculations, test results and copies of the appropriate issues of Australian Standards and ADR's, should be collated in the format specified in each section by the person responsible for the modification certification. These data should be retained by that person for a minimum of seven years after commissioning of the modified vehicle. This is to be available for inspection by officers of the relevant Federal, State or Territory authority.

HEAVY VEHICLE MODIFICATIONS

Appendix 1

DEFINITIONS, ACRONYMS and ABBREVIATIONS

ADR - see Australian Design Rule.

Aggregate Trailer Mass - the total mass of the laden trailer when carrying the maximum load recommended by the *'Manufacturer'*. This will include any mass imposed onto the drawing vehicle when the *'Combination Vehicle'* is resting on a horizontal supporting plane.

Articulated Vehicle - a combination of *'Prime Mover'* and *'Semi-trailer'*.

ATM - see Aggregate Trailer Mass.

Australian Design Rule - a national standard for road vehicles or vehicle components under Section 7 of the *Motor Vehicle Standards Act*.

Australian Motor Vehicle Standard - any standard approved under the *Motor Vehicle Standards Act 1989* by the Federal Minister of Transport and Communications. At present these comprise the Australian Design Rules 2nd and 3rd editions.

Average Operating Pressure (AOP) – the arithmetic average of the *'Manufacturer's'* specified maximum and minimum pressures in the operating pressure range.

Axle - the axis of rotation of wheels.

Axle Group - either a *'Single Axle'*, *'Tandem Axle Group'*, *'Tri-axle Group'*, or *'Close Coupled Axle Group'*.

Axle Load - total load transmitted to the road by all the tyres of all the wheels whose centres may be included between two transverse parallel vertical planes less than one metre apart.

Body - the structure added to a chassis or a *'chassis and cab'* for containing the load or other special purpose.

Certifying Officer - the person who is authorised by the State or Territory in which the subject vehicle is registered to conduct evaluations and certification of a particular type of modification and who certifies that the subject modified vehicle continues to conform with the applicable Australian Design Rules and other requirements for registration in that State or Territory.

Close Coupled Axle Group - two *'Axles'* with centres not more than one metre apart shall be regarded as equivalent to a *'Single Axle'*; three *'Axles'* with centres not more than two metres apart shall be regarded as equivalent to a *'Tandem Axle Group'*; four or more *'Axles'* with centres not more than 3.2 metres apart shall be regarded as equivalent to a *'Triaxle Group'*.

Combination Vehicle - either a combination of a rigid goods vehicle and one trailer (other than a *'Semi-trailer'*); or an *'Articulated Vehicle'*.

Converter Dolly - specially designed *'Pig Trailer'* to convert a *'Semi-trailer'* to a *'Dog Trailer'*.

Coupling - mechanical assembly that provides a connection between the *'Drawbar'* of the trailer and the *'Towbar'* of the drawing vehicle

HEAVY VEHICLE MODIFICATIONS

Coupling - Ball Type - a device which uses a spherically machined cantilevered ball to which is attached and locked a hemispherical receptacle, forming a coupling between the two. The ball is generally attached to the 'Towbar' of the drawing vehicle whilst the hemispherical receptacle is attached to the 'Drawbar' of the drawn vehicle. The spherical shape allows unrestricted articulation in the horizontal plane and restricted articulation in the vertical plane.

Coupling - Hook Type - a device comprising an inverted hook, provided with a coupling lock mechanism, which is attached to the drawing vehicle. The hook accepts the bore of a towing eye that is attached to the 'Drawbar' on the towed vehicle. Generally, greater clearances are provided between these two coupling components, and the assembly allows for significant vertical angular oscillation between the vehicle and trailer.

Coupling - Pin Type - a device that uses the insertion of a vertical pin through the hole of a 'Drawbar' towing eye. The pin is located and retained above and below the towing eye by the coupling fork of the 'Towbar'.

Critical Speed of Propeller Shaft (self destruct speed) - is the propeller shaft rotational speed at which the rotational speed is equal to the natural bending frequency of the shaft.

'D' Value - an expression of strength capacity of connection devices as defined in Australian Standard AS1773-1996 'Articulated Vehicles - Fifth Wheel Assemblies' or Australian Standard AS2213.2 - 1998 '50 mm Pin-type Couplings and Drawbar Eyes' as applicable.

Departure Angle - the smallest angle, in a side view of a vehicle formed by the level surface on which the vehicle is standing and a line tangent to the rear tyre arc and touching the underside of the vehicle rearward of the rear tyre.

Dog Trailer - a trailer with two 'Axle Groups' of which the front 'Axle Group' is steered by connection to the drawing vehicle.

DoTRS - (Federal) Department of Transport and Regional Services (formerly Federal Office of Road Safety).

Drawbar - portion of a trailer that connects the trailer body to the 'Coupling' for towing purposes.

Dual Steer System - a steering system by means of which a vehicle may be steered from either one of two alternative driving positions.

ERC (Established Retardation Coefficient) - is the average braking deceleration calculated when the energy level in the least favoured 'Brakes' actuator reaches 65% of 'Average Operating Pressure' (AOP) to when the vehicle becomes stationary, expressed as a proportion of the acceleration due to gravity.

Fifth Wheel - a device used with either a 'Prime Mover' or a 'Converter Dolly' to permit quick coupling and uncoupling of a 'Semi-trailer' and provide for articulation.

Fifth Wheel - Fixed Base - a 'Fifth Wheel' assembly where the transverse pivot axis of the 'Fifth Wheel' is always fixed relative to the 'Prime Mover'.

Fifth Wheel Lead - the distance in side elevation of the articulation point of the 'Fifth Wheel' assembly ahead of the centre line of the drive 'Axle Group'.

Fifth Wheel - Sliding - a 'Fifth Wheel' that is readily adjustable in regard to fore and aft position on the vehicle chassis.

HEAVY VEHICLE MODIFICATIONS

Fifth Wheel - Turntable Based ('Stabilised') - a *'Fifth Wheel'* assembly where the transverse pivot axis is always fixed relative to the *'Semi-trailer'*. All relative rotation between the *'Prime Mover'* and the *'Semi-trailer'* occurs in the slewing base (turntable).

GCM - see Gross Combination Mass.

Gross Combination Mass - value specified for the vehicle by the *'Manufacturer'* as being the maximum of the sum of the *'Gross Vehicle Mass'* of the drawing vehicle plus the sum of the *'Axle Loads'* of any vehicle capable of being drawn as a trailer.

Gross Vehicle Mass - the maximum laden mass of a motor vehicle as specified by the *'Manufacturer'*.

GVM - see Gross Vehicle Mass.

Guideline - a document that establishes a minimum standard for assessment of modified vehicles.

Heavy Vehicle - for the purposes of this National Code of Practice, a heavy vehicle is defined as:

- a motor vehicle with a GVM greater than 4.5 tonnes or,
- a trailer with an ATM greater than 4.5 tonnes

Lightly Loaded Test Mass - The mass of the unladen vehicle with a full capacity of lubricating oil and coolant not less than 75% of full fuel capacity, but without goods, occupants or options except those options which are essential for the test procedure specified, plus additional loading distributed in the seating position adjacent to the driver's seating position so that the mass of such loading plus the mass of the driver and instrumentation mounted in the vehicle is 155 +/- 30kg. In the case of a *'cab and chassis'* condition, an additional loading not exceeding 7.5% of the GVM shall be located with its centre of mass within 200mm of the designated load centre measured in a horizontal plane.

Load Sharing Suspension - an *'Axle Group'* suspension system that utilises hydraulic, pneumatic or other means to effect substantially equal sharing, by the ground contact surfaces of the *'Axle Group'*, of the total load carried by the *'Axle Group'* and has effective damping characteristics on all axles of the *'Axle Group'*. Acceptable Load Sharing Suspensions are described in publications prepared by the Commonwealth Department of Transport and Regional Services.

Manufacturer - the name of the person or company who accepts responsibility for compliance with the *'Australian Design Rules'* and to whom the Compliance Plate Approval certificate is issued.

Modification Code - a particular type, style or class of modification within a vehicle system for which a separate set of detail requirements and check list have been devised and included in the National Code of Practice.

National Code of Practice - the name given to this complete document, comprising Part A – Administrative Aspects and Part B - Technical Aspects.

Pig Trailer - a trailer having one *'Axle Group'* near the middle of the length of the goods-carrying surface.

Platform Loader - a platform type of goods lift *'permanently'* fixed to the vehicle to assist loading and unloading of the vehicle and which is either hydraulically and/or mechanically operated. Typical types include:

- underbody stow
- folding tailgate
- folding post.

HEAVY VEHICLE MODIFICATIONS

Power Steering - Integral - a power steering system in which a force generated by a secondary power source is applied to the active parts within the steering gear housing.

Power Steering - Ram Type - a power steering system in which a force generated by a secondary power source is applied to the steering linkage between the steering gear and the road wheels.

Pre-ADR - a vehicle built prior to the date on which an ADR, subsequently applicable to vehicles of that category, came into force.

Prime Mover - a rigid motor vehicle designed to haul a '*Semi-trailer*'.

Retractable Axle - an '*Axle*' which has means of adjustment to enable it to be raised or lowered relative to the vehicle's horizontal datum to substantially vary the '*Axle Load*' distribution between the '*Axles*' of any '*Axle Group*'.

Roadworthy Componentry - roadworthy in accordance with manufacturer's specifications, the Australian Vehicle Standards Rules or the Roadworthiness Guidelines.

Safe Working Load - the maximum mass which may be, i.e. is permitted to be, safely handled.

SWL - see Safe Working Load

Tailshaft - any drive shaft connection between the power/transmission unit and a drive '*Axle(s)*'.

Tandem Axle Group - a combination of two '*Axles*' which are not less than one metre and not more than two metres apart.

Tri-axle Group - a combination of three '*Axles*' in which the front and rear '*Axles*' are not less than two metres and not more than 3.2 metres apart.

Safety Lock - a mechanical device for securely locking a component or assembly in its stowed position.

Safety Chain - a chain fitted to a substantial portion on a trailer that will hold the trailer in tow in the event of failure of, or accidental detachment of the coupling.

Section of Code - individual section of the National Code of Practice for Heavy Vehicle Modifications dealing with a particular administrative or technical (vehicle) system.

Semi-trailer - a trailer having one '*Axle Group*' which is towards the rear, and having means of attachment to a '*Prime Mover*' whereby some of the load is imposed on the '*Prime Mover*'.

Single Axle - either one '*Axle*', or two '*Axles*' with centres between transverse, parallel, vertical planes spaced less than one metre apart.

Steering Linkage Components - nomenclature for the links and arms of the steering linkage is illustrated in Appendix 1 of Section E - Front Axle and Steering.

Startability Gradient - the minimum road gradient on which the vehicle, loaded to its GVM or GCM, whichever is the greater, can be set in motion and accelerated up the gradient.

Tandem Axle Group - a combination of two '*Axles*' that are not less than one metre and not more than two metres apart.

Towbar - a device attached to the drawing vehicle provided for connection of the drawing vehicle to the '*Coupling*' for the towing of a trailer.

HEAVY VEHICLE MODIFICATIONS

Triaxle Group - a combination of three 'Axles' in which the front and rear 'Axles' are not less than two metres and not more than 3.2 metres apart.

Tractor Protected Air Supply - a system of supply of power and signal air from a tractor mounted source to the brakes of both the tractor and trailer.

Twin Steer Axle Group - A combination of two 'Axles', with single tyres, which are fitted to a motor vehicle connected to the same steering mechanism and are not less than one metre and nor more than two metres apart.

Unladen Mass - the mass of the vehicle in running order unoccupied and unladen with all fluid reservoirs filled to nominal capacity, including fuel, and with all standard equipment.

Wheelbase - Refer to Appendix 3

HEAVY VEHICLE MODIFICATIONS

Appendix 2

REFERENCED DOCUMENTS

'Definitions', *Australian Design Rules for motor vehicle safety, 2nd & 3rd Editions*

Australian Design Rule ADR 2/..; *Door Latches and Hinges.*

Australian Design Rule ADR 3/..; *Seat Anchorages.*

Australian Design Rule ADR 4/..; *Seat Belts.*

Australian Design Rule ADR 5/..; *Anchorages for Seat Belts.*

Australian Design Rule ADR 6A, 6/..; *Turn Signal Indicators.*

Australian Design Rule ADR 7/..; *Hydraulic Brake Hoses.*

Australian Design Rule ADR 8/..; *Safety Glass.*

Australian Design Rule ADR 10/..; *Steering Column.*

Australian Design Rule ADR 11/..; *Internal Sunvisors.*

Australian Design Rule ADR 12/..; *Glare Reduction.*

Australian Design Rule ADR 13/..; *Installation of Lighting & Light Signalling Devices on other than L-Group Vehicles.*

Australian Design Rule ADR 14/..; *Rear Vision Mirrors.*

Australian Design Rule ADR 15/..; *Demisting of Windscreens.*

Australian Design Rule ADR 16/..; *Windscreen Wipers and Washers.*

Australian Design Rule ADR 17/..; *Fuel Systems.*

Australian Design Rule ADR 18/..; *Location and Visibility of Instruments.*

Australian Design Rule ADR 21/..; *Instrument Panels.*

Australian Design Rule ADR 22/..; *Head Restraints.*

Australian Design Rule ADR 24/..; *Tyre and Rim Selection.*

Australian Design Rule ADR 28/..; *External Noise of Motor Vehicles Other Than L-Group Vehicles.*

Australian Design Rule ADR 30/..; *Diesel Engine Exhaust Smoke Emission.*

Australian Design Rule ADR 35, 35A & 35/..; *Commercial Vehicle Braking Systems.*

Australian Design Rule ADR 36/..; *Exhaust Emission Control for Heavy Vehicles.*

Australian Design Rule ADR 42/..; *General Safety Requirements.*

HEAVY VEHICLE MODIFICATIONS

Australian Design Rule ADR 43/...; *Vehicle Configuration and Marking.*

Australian Design Rule ADR 44/...; *Specific Purpose Vehicle Requirements.*

Australian Design Rule ADR 58/...; *Requirements for Omnibuses for Hire & Reward.*

Australian Design Rule ADR 62/...; *Mechanical Connections Between Vehicles.*

Australian Design Rule ADR 63/...; *Trailers Designed for Use in Road Trains.*

Australian Design Rule ADR 65/...; *Maximum Road Speed Limiting for Heavy Goods Vehicles and Heavy Omnibuses.*

Australian Design Rule ADR 70/...; *Exhaust Emission Control for Diesel Engined Vehicles.*

Australian Design Rule ADR 80/...; *Emission Control for Heavy Vehicles (Applicable 1 January 2002).*

Australian Standard AS D8-1971 *Hose Couplings for use with Vacuum and Air Pressure Braking Systems on Prime Movers, Trailers and Semi-trailers.*

Australian Standard AS 1110 - 2000 *ISO Metric Hexagon Precision Bolts and Screws.*

Australian Standard AS 1418 - *Cranes (Including Hoists and Winches)*

- Part 1 (1994 and Amendment 1997) - General Requirements
- Part 2 (1997) - Serial Hoists and Winches
- Part 5 (1995) - Mobile and Vehicle Loading Cranes

Australian Standard AS 1554.1- 2000 *Welding of Steel Structures.*

Australian Standard AS 1771 - 1996 *Installation of Fifth Wheel Assemblies.*

Australian Standard AS 1773 - 1996 *Articulated Vehicles - Fifth Wheel Assemblies.*

Australian Standard AS 2174 - *Articulated Vehicles— Mechanical coupling between prime movers and semi trailers – Interchangeability requirements.*

- Part 1 - 1994 *Non dedicated vehicle combinations.*
- Part 2 - 1994 and Amendment 1995 *Dedicated vehicle combinations .*

Australian Standard AS2175 – 1995 - *Articulated Vehicles - King Pins.*

Australian Standard AS 2177 (Part 1 - 1994 and Part 2 - 1982) *Non destructive testing - Radiography of Welded Butt Joints in Metal.*

Australian Standard AS 2213.2 -1998 *50 mm Pin-type Couplings and Drawbar Eyes for Trailers.*

Australian Standard AS 2739:1999 *Natural gas (CNG) fuel systems for vehicle engines.*

Australian Standard AS 2809 - *Road Tank Vehicles for Dangerous Goods*

- Part 1- 1999,
- Part 2 - 1999,
- Part 3 - 1999,

HEAVY VEHICLE MODIFICATIONS

- Part 4 – 2001; and
- Part 5 - 1990.

Australian Standard AS 3856 – 1998 *Hoists and Ramps for People with Disabilities - Vehicle Mounted - Parts 1 and 2.*

British Standard BS AU 217: Part 1 1987 *Maximum Road Speed Limiters for Motor Vehicles.*

Society of Automotive Engineers Standard J 726 - May 1981 *Air Cleaner Test Code.*

Society of Automotive Engineers Standard J844 Oct 1990 *Non-Metallic Air Brake System Tubing.*

Society of Automotive Engineers Standard J1402 Oct 1980 *Automotive Air Brake Hose and Hose Assemblies.*

Society of Automotive Engineers Standard J1403A *Vacuum Brake Hose.*

Tyre and Rim Association of Australia Standards Manual (Current Edition).

NOTE: Reference to Australian Design Rule ADR xx/., is to be interpreted to mean all individual versions of the relevant 3rd Edition Australian Design Rule at the date of modification. For example, ADR 5/., refers to ADR's 5/00, 5/01, 5/02, 5/03 and 5/04.

Reference to Australian Design Rule ADR xx, is to be interpreted to mean all individual versions of the relevant 2nd Edition Australian Design Rule at the date of modification. For example, ADR 4 refers to ADR's 4, 4A, 4B, 4C and 4D.

At the time of modification, the current Australian Standards must be utilized. The vehicle must also continue to meet the Australian Design Rules applicable at the date of manufacture. However, vehicles undergoing brake system modifications must comply with the requirements of Part B, Section G (Clause 2) of this National Code of Practice.

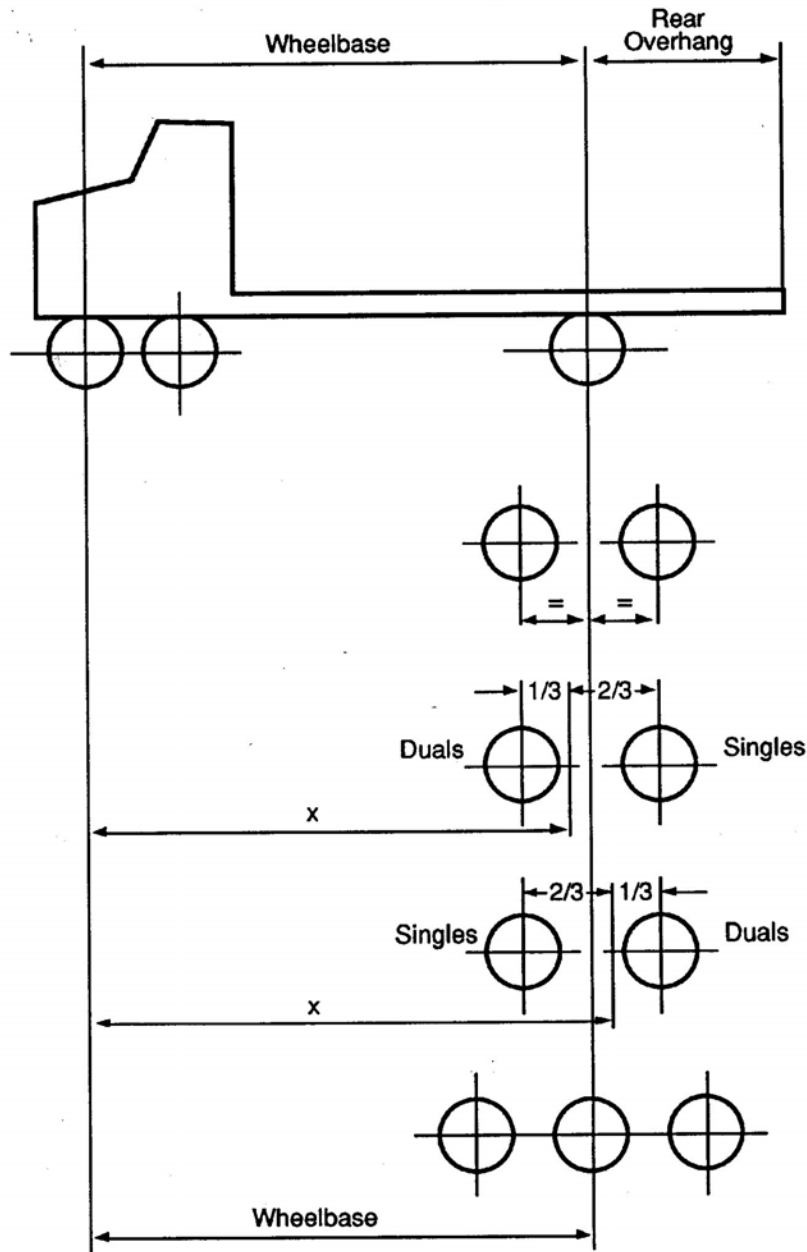
HEAVY VEHICLE MODIFICATIONS

Appendix 3

DEFINITION OF WHEELBASE

WHEELBASE

The dimension measured horizontally and parallel to the longitudinal axis of the vehicle between the front and the rear wheel centrelines at 'Unladen Mass'. In the case of multiple 'Axles' in the rear 'Axle Group', the dimension shall be midpoint of the centrelines of the extreme 'Axles' of the 'Axle Group'. If the configuration includes a steerable or rear 'Retractable Axle', the measurement of the wheelbase shall be without regard to the presence of the steerable 'Axle' or the 'Retractable Axle'. For a steerable front 'Axle' or 'Axle Group' the dimension shall be to the centreline of the foremost 'Axle' (see illustration following).



x = Distance from front "Axle" to the line from which the "Rear Overhang" is measured