

Guidelines for alternative wheels and tyres

Purpose

This Vehicle Standards Information (VSI) No. 9 is intended to provide vehicle owners, operators and licensed certifiers with guidelines for fitting alternative wheels and/or tyres to those supplied as original equipment by the vehicle's manufacturer.

This VSI No. 9 applies to light vehicles up to and including 4.5 tonnes gross vehicle mass (GVM).

Introduction

Fitting the correct wheels and tyres is vital to your vehicle's safety. Since 1971, strict design standards have been progressively introduced to specify safer wheel rims, tyre strength, air pressures, speed ratings, and allowable combinations of wheel and tyre sizes.

Tyres fitted to your vehicle must meet the construction standards set out in Australian Design Rules (ADR) 23. In addition to complying with ADRs, vehicles registered in NSW must be fitted with wheels and tyres that conform to dimensional standards specified in the Tyre and Rim Association of Australia's latest annual '*Standards Manual*' publications, and meet other applicable rules of the Road Transport (Vehicle Registration) Regulation 2017.

All vehicles manufactured since 1973 are fitted with a tyre placard, usually located in the glove box, the engine bay or on a door pillar. It specifies the wheel and tyre combinations recommended by the manufacturer, and the tyre's load capacity, speed rating and recommended inflation air pressure.

Changes to your vehicle's wheels and tyres can alter its behaviour on the road so there are limits to the changes that are permitted. This VSI specifies these limits but it is still your responsibility to ensure your vehicle remains safe to drive. Significant modifications to your vehicle's wheels and tyres need to be assessed and certified by a licensed certifier to ensure your vehicle still complies with applicable NSW vehicle standards. Refer to page 6 for more information. If you are unsure about how a proposed change might affect your vehicle or if it is a significant modification, you should consult a licensed certifier. Refer to page 6 for more information.

If the alterations go beyond the guidelines outlined in this VSI, you could be stopped by police and issued with a fine and a defect notice for your vehicle. Non-standard modifications can also be detected at a routine vehicle safety-check inspection, sometimes called a 'pink slip'. This may cause your vehicle to fail the inspection.

It is also advisable that you check with your vehicle's manufacturer and your insurance company before changing your wheels or tyres outside the limits set by the tyre placard, as it might invalidate the manufacturer's warranty and void your insurance cover.

Wheels

REQUIREMENTS FOR ALTERNATIVE WHEELS

When alternative wheels and tyres are fitted to a vehicle, the following requirements must be met:

- You must not fit wheels with rim widths less than the minimum width fitted by the vehicle manufacturer for the particular model.
- The alternative wheel must not increase wheel track of passenger cars (or derivatives) by more than 25 mm beyond the maximum specified by the vehicle manufacturer. The wheel track of off-road four wheel drive vehicles and goods vehicles (MC, NA, or NB ADR category) must not be increased by more than 50mm beyond the maximum specified by the vehicle manufacturer for the particular model.
- Where non-original axle or suspension components are fitted, the wheel offset in relation to the axle or stub axle assembly used shall not be increased by more than 12.5 mm each side of the vehicle based on the specifications for the axle components.
- The wheel and tyre must be contained within the bodywork or mudguards, including any flares, when the wheels are aligned straight. The wheel and tyre must not contact any part of the body or suspension under all operating conditions, including when the front wheels are steered to full lock with the suspension fully compressed.
- All wheels fitted to an axle must be of the same construction, diameter, offset, width and mounting configuration, except for spare wheels used in an emergency situation. The wheel must not prevent the wheel nuts from fully engaging their studs.
- The wheel rim must not have a circumferential weld other than that which attaches the rim to the wheel centre.
- The wheel must be designed for the particular hub/axle in respect to bolt pitch circle diameter and wheel nut tapers. Wheels with slotted stud holes must not be used.
- Speedometer accuracy must be maintained and adjusted where necessary.
- Wheel spacers or adaptors must not be used for wheel conversions between the wheel mounting face and the wheels unless fitted as original equipment by the vehicle manufacturer.

Some modifications may require certification by a licensed certifier to ensure your vehicle still complies with applicable NSW vehicle standards. Refer to page 6 for more information.

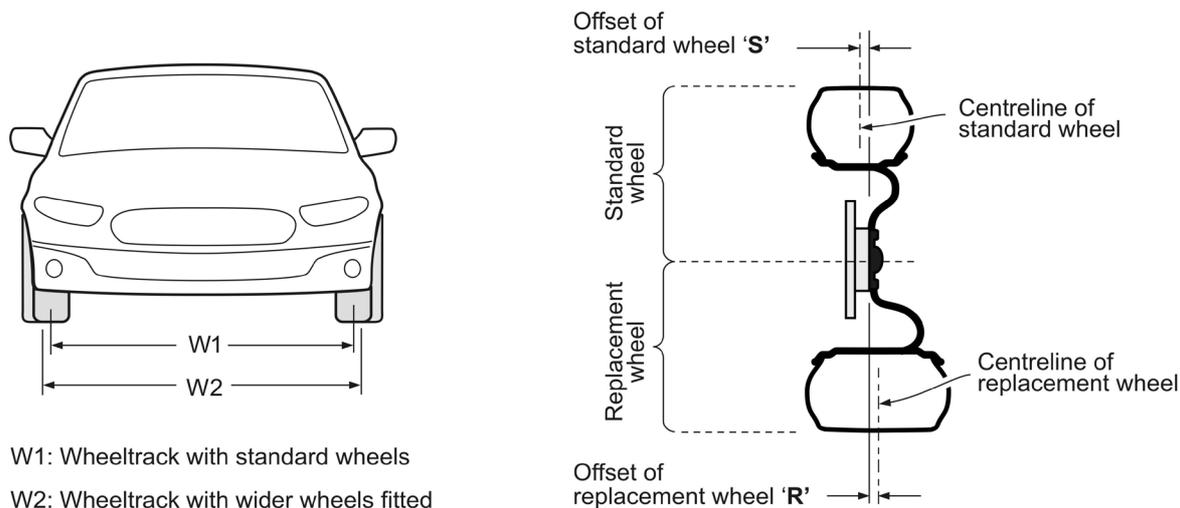
VEHICLES WITH DIAGONALLY SPLIT BRAKE SYSTEMS

Except where the original manufacturer allows, front and rear wheel widths must be the same. The front wheel offset and front wheel track must remain as original.

WHEEL TRACK AND WHEEL OFFSET

- **Wheel track** is the distance between wheels on the same axle, measured between the rim centrelines. Usually, a vehicle's front and rear wheel tracks are different.
- **Wheel offset** is the distance between the centreline of the wheel and the hub mounting surface.
- If you fit wider wheels you will probably increase the wheel track, and this is usually associated with a change in wheel offset, increasing the loads on bearings, axles, suspension joints and steering tie rods.
- Wheel offset must not exceed the limits set by the vehicle manufacturer.

FIGURE 1: WHEEL TRACK AND WHEEL OFFSET



In this example, the change in offset is 'S' + 'R'

Tyres

Never mix tyre types or sizes on an axle, unless when using an emergency spare tyre. Never mix radial tyres (where the cord plies are arranged 90° to the direction of travel) with cross-ply tyres (where the cord plies are arranged in a criss-cross pattern) on one axle. If you have only two radial tyres, they must be fitted to the rear wheels.

All road tyres must have tread patterns to assist with expelling moisture on the road surface so that adhesion and traction are maintained in wet conditions. However, they must not have cleats or other hard gripping devices that could damage road surfaces.

Some tyres have directional tread patterns. They have arrows on the side walls showing the direction they are designed to rotate and the tread patterns generally form a 'v' point shape. Directional tyres can be swapped between the front and rear axles, but on one side only.

Some tyres have symmetrical tread patterns. They have the same patterns on both the outer and inner tread. These tyres can be fitted in any direction and can be swapped to either side of the front and rear axles.

Some tyres have asymmetrical tread patterns. They have different patterns on the outer and inner tread. The outer tread usually has larger grooves for better water dispersion and increased wet handling while the inner tread usually has smaller grooves to increase contact area and improve grip. These tyres can be fitted in any direction, and can be swapped to any sides of the front and rear axles, but the tyre side walls marked 'Outside' must always face outwards.

Ensure you check the manufacturer's directions on using the tyres fitted to your vehicle correctly.

Any damaged tyre including the spare tyre should be repaired or replaced immediately.

If you require more technical information about your tyres refer to the Tyre and Rim Association of Australia's latest annual '*Standards Manual*' publications.

TYRE LOAD RATING

All replacement tyres must have a load rating equal to or higher than the rating of the original tyres fitted by the vehicle manufacturer. This information is available from the tyre placard or the vehicle manufacturer.

The tyres themselves must have the following markings where applicable to the type of tyre:

- Manufacturer's name or mark
- Tyre designation, for example "P" for passenger car tyres

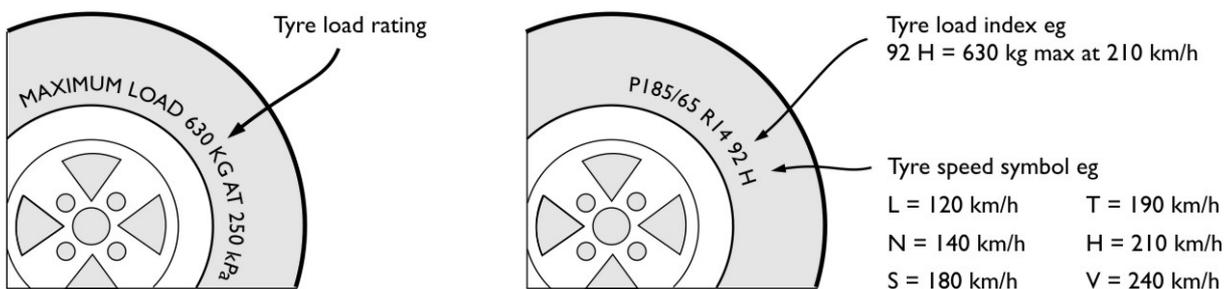
- Tyre size in combination of metric and imperial numbers, for example 205/55 R16, refers to tyre width of 205mm, tyre height to width ratio, or aspect ratio of 55%, and rim outer diameter of 16 inches.
- Tyre construction information, for example “R” for radial-ply tyres
- Tyre speed rating symbol, for example “V” for a maximum speed up to 240km/h
- The load capacity index, for example “62” refers to a maximum mass of 265kg the tyre can carry
- The date of manufacture , for example “3015” refers to week 30 of the year 2015
- The letters “M+S”, “M.S” or “M&S” for a snow tyre



- The symbol  for a winter tyre
- The word "TUBELESS" if the tyre is designed for use without an inner tube
- The word "REINFORCED" or the words "EXTRA LOAD" if the tyre is a reinforced tyre designed for heavier loads compared to a standard tyre of the same size
- The words "TEMPORARY USE ONLY" in the case of temporary use spare tyres
- A run flat symbol or the letters “SSR” if the tyre is a "run flat" or "self-supporting" tyre.

The markings must be on both side walls in the case of symmetrical tyres, and at least on the outer side wall in the case of asymmetrical tyres. An example of basic tyre markings is shown in Figure 2.

FIGURE 2: TYRE MARKING

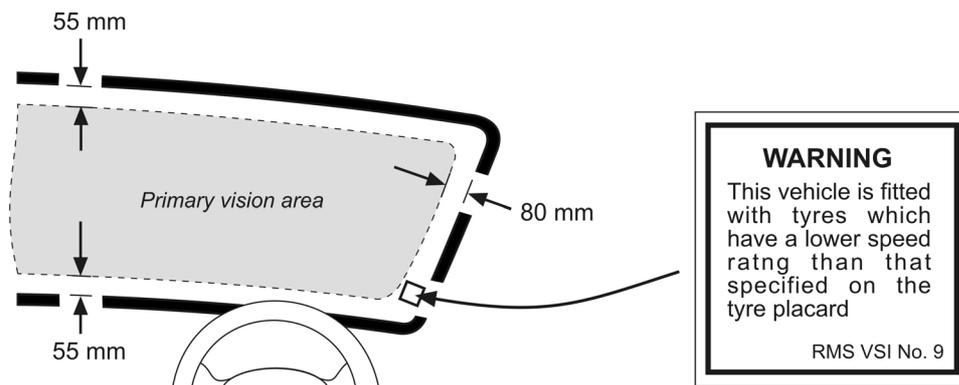


TYRE SPEED RATING

The speed rating of tyres fitted should be equal to or higher than the rating of the original tyres fitted by the vehicle manufacturer. However:

- If the speed rating of the tyres specified for your vehicle is higher than 180 km/h, you may fit tyres with a lower speed rating, but not lower than the vehicle’s top speed
- If the replacement tyres fitted have a speed rating less than that shown on the vehicle’s tyre placard, it is recommended that a warning label be affixed to the vehicle as shown in Figure 3. Usually, the tyre dealer attaches the label.

FIGURE 3: WARNING LABEL



The label should be:

- At least 40 mm x 40 mm in size, made of durable material, with not less than 2 mm high black lettering on an orange coloured background
- Located in an area conspicuous to the driver. This is usually on the inside of the windscreen, outside of the primary vision area. The primary vision section of the screen is the area the driver normally looks through when driving the vehicle.

RETREADED TYRES

The Road Transport (Vehicle Registration) Regulation 2017 requires all retreaded tyres fitted to vehicles to comply with the provisions of the applicable Australian Standard. Tyres retreaded after 29 June 1998 must comply with the provisions of Australian Standard AS 1973-1993 "Pneumatic tyres - Passenger Car, Light Truck and Truck/Bus - Retreading and Repair Process". In accordance with this standard, the tyre must have markings specifying the identity of the retreader, the date it is retreaded, the words 'RETREAD' or 'REMOULD' as applicable, and the tyre's speed limit.

REGROOVED TYRES

Regrooved tyres must not be fitted to a vehicle unless the tyres were constructed with an extra thickness of rubber designed for re-cutting or regrooving and are labelled accordingly on the sidewall.

COLOURED WALL TYRES

Coloured wall tyres have a coloured band on the outer walls to replicate classic vehicle looks. There are three ways to colour tyres:

1. Manufactured 'coloured wall' tyres

These tyres have a layer of coloured rubber material included in the tyre manufacturing process. Such tyres are manufactured to meet the standards and regulation applying to them, but these tyres are usually manufactured in sizes to suit classic vehicles and therefore may not suit newer and heavier vehicles. If you intend to fit your vehicle with coloured wall tyres, you must ensure the tyres are the correct size, speed and load ratings specified for the vehicle.

2. Tyres with additional 'coloured wall' bands

These additional coloured bands are commonly called 'Porta walls'. They consist of a coloured band that is attached with adhesives to the sidewall of the tyre, covering the sidewall to the bead area under the rim. If fitting bands, ensure:

- The original mandatory markings and specifications for the tyre are not obstructed
- The addition of the coloured band does not reduce the tyre's integrity; for example, by interfering with the original tyre beads and causing them to lose proper seal with the rim edges.

3. Modified 'coloured wall' tyres

These tyres are not legal in NSW. They usually have sidewalls that are ground or buffed to provide a base for coloured paint to be applied. Any grinding or buffing to parts of the tyre is a safety concern as it has the potential to induce weak spots within the tyre wall structure. These imperfections may induce cracks and splits sooner than in an unmodified tyre. Additionally, the ground/buffed tyres may no longer meet the standards and regulation applying to them when they were first manufactured due to, for example, the loss of required markings.

RUN FLAT TYRES

A run flat tyre has a stronger sidewall structure and if punctured it is claimed to be able to adequately support the vehicle for a short distance, usually to a maximum speed of 80km/h. A vehicle equipped with run flat tyres must be fitted with an onboard Tyre Pressure Monitoring System (TPMS) to inform the driver if the tyre has a puncture. If a TPMS is fitted to your vehicle, ensure that you are familiar with its use and care specifications.

SPACE SAVER SPARE WHEELS

Some vehicles are supplied with a temporary-use, space-saver spare wheel.

Space-saver wheels should only be used in emergency situations and for as short a distance as possible. Typically, they are rated at a maximum speed of 80km/h. When your damaged tyre is repaired or replaced, you should fit it on the vehicle immediately.

Significant modifications requiring certification

Some modifications require a compliance certificate from a licensed certifier.

If you intend to modify the axle or suspension, or fit certain non-original components, a compliance certificate from a licensed certifier will be required.

If the licensed certifier is satisfied that the modifications are safe for your vehicle, you will be issued with a compliance certificate. It is recommended that a copy of the compliance certificate is carried in the vehicle and presented to an authorised Roads and Maritime Officer or NSW Police Officer on request.

For information on when a compliance certificate is required (for example fitting replacement tyres that increase or decrease tyre diameter by more than 7% of the overall original tyre diameter), see VSI No.6 '*Light vehicle modifications*', or Vehicle Standard Bulletin (VSB) No. 14 'National Code of Practice for Light Vehicle Construction and Modification'. Refer to page 7 for information on obtaining a copy.

For information on finding an accredited licensed certifier on the Roads and Maritime Services Vehicle Safety Compliance Certification Scheme (VSCCS) refer to VSCCS Bulletin No. 1 'Licensed Certifiers'. Refer to page 7 to obtain a copy.

FURTHER INFORMATION

Roads and Maritime Services

www.rms.nsw.gov.au | T 13 22 13

- VSI No. 6 'Light vehicle modifications' accessible at <http://www.rms.nsw.gov.au>

Roads and Maritime Technical Enquiries

PO Box 1120, Parramatta NSW 2124

E technical.enquiries@rms.nsw.gov.au | T 1300 137 302 | F 02 8849 2754

- Vehicle construction and registration requirements in NSW

Roads and Maritime Vehicle Safety Compliance Certification Scheme (VSCCS)

www.rms.nsw.gov.au/vscs | E vscs@rms.nsw.gov.au | T 1300 336 206

- VSCCS Bulletin No.1 '*Licensed certifiers*' accessible at <https://www.rms.nsw.gov.au/documents/>

NSW Legislation

www.legislation.nsw.gov.au

Road Transport (Vehicle Registration) Regulation 2017 accessible at <https://www.legislation.nsw.gov.au/>

Department of Infrastructure and Regional Development

GPO Box 594 Canberra ACT 2601

www.infrastructure.gov.au | T 1800 815 272 F (02) 6274 6013

- VSB No. 14 '*National code of practice for light vehicle construction and modification*' accessible at https://infrastructure.gov.au/roads/vehicle_regulation/