

Chapter 19

Wheels and Tyres

Contents

Description	323
Routine Maintenance	324
Trouble Shooting	325
Changing a Wheel	326

Specifications

TYRE PRESSURES

Due to the variances in wheel rim sizes, tyre type/construction and load conditions, it is recommended to refer to the tyre placard fitted to the vehicle for the correct inflation pressure pertaining to the wheel/tyre combination and the load being carried.

The placard is located on the drivers door pillar, adjacent to the lock striker.

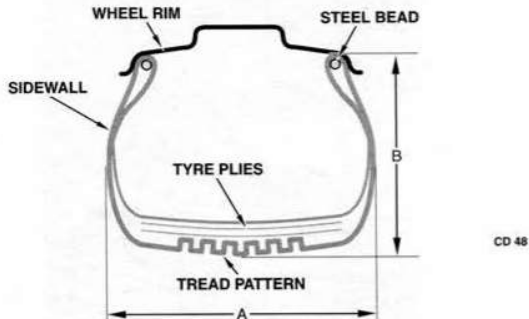
Consult your local traffic authority if any tyre and rim combinations that are to be installed, are outside the dimensions mentioned on the placard.

TORQUE WRENCH SETTINGS

Wheel nut torque 113 Nm

Description

Tyres have two basic functions. Firstly they absorb a portion of the shock from uneven road surfaces, therefore assisting the vehicles suspension in providing a smooth ride. Secondly they supply the friction contact that is required between the wheel and the road, which is essential for acceleration, braking and cornering.



Tubeless tyre and wheel rim showing the various components.
Aspect ratio is determined by calculating the height B as a percentage of the width A. For example, if dimension:
A = 205 mm and B = 133.5 mm the tyre aspect ratio is 65 because the height is 65% of the tyre width.



The tyre placard is located on the drivers door pillar.

Tyres are available in varying types of diameters, width, aspect ratio (profile), speed rating, and number of plies.

The tyre diameter is measured in inches from bead to bead through the centre line of the tyre. Tyre width is measured in millimetres at the widest point from side wall to side wall. Both figures are included in the tyre size coding.

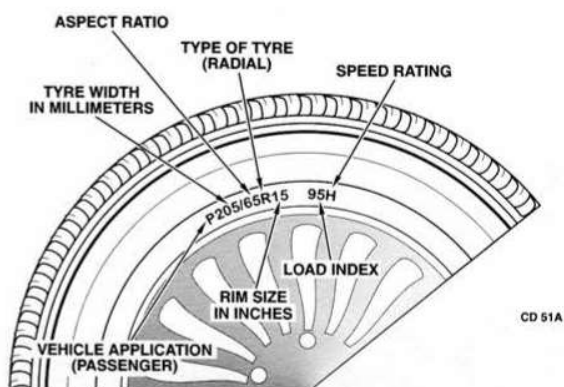
The aspect ratio, commonly referred to as the profile or series, is the relationship of the width and the cross section height of the tyre, as measured between the bead and the tread of a new tyre. This relationship is stated as a percentage, for example if a tyre has a width of 205 mm and the height is 133.25 mm, the profile would be a 65 series tyre because the height is 65% of the width. This figure is included in the tyre size coding. The higher the number the taller the tyre.

The speed rating gives the maximum speed at which the tyre manufacturer recommends a new tyre to be operated. Speeds above recommendation may cause the tyre to fail due to overheating or separation. Refer to the table below.

SPEED RATING TABLE											
Letter	L	M	N	P	Q	R	S	T	U	H	V
Speed km/h	120	130	140	150	160	170	180	190	200	210	OVER 240

Plies were originally made of cotton. The tyre marked 2 ply, 4 ply, etc. indicated the number of cotton plies used in the construction of that tyre. Development of higher strength plies enabled the actual number of plies to be reduced, while maintaining the same tyre strength. The word rating was added to indicate not

324 | Wheels and Tyres



Tyre identification information. In this case the tyre size is a **P205/65R15**, meaning it is a 15 inch radial tyre with a normal width of 205 mm and an aspect ratio of 65%.

the number of plies but the strength of the tyre as one with the equal number of cotton plies.

A variety of materials are used in the construction of a tyre's plies and can consist of one or a combination of the following materials: nylon, polyester, rayon and steel.

The tread pattern of a tyre varies greatly from type and manufacturers. The tread function is to assist the tyre to retain traction under wet road conditions. This is achieved by channelling water away from the tyre contact area.

There are three types of tyre in common use, cross ply, radial ply and retreaded tyres. Each type has specific characteristics, advantages and disadvantages. Tyres are also available in either tube or tubeless type. A tube type tyre should never be used without a tube fitted.

Two steel beads are part of the construction of all tyres, these beads prevent the tyre from stretching and becoming separated from the rim.

Routine Maintenance

STEEL WHEELS

Steel wheels should be regularly cleaned of all foreign matter, such as dirt and mud. If foreign matter is allowed to build up it will affect the balance of the wheel and may cause vibrations and uneven tyre wear. If the paint has been chipped or scratched, it should be touched up to prevent rust.

Any minor damage to the wheel rim can usually be repaired using a hammer after the wheel has been removed from the vehicle and the tyre has been taken off the rim. However, any major rim damage or buckling will necessitate renewal of the rim. It is a good policy to occasionally remove the wheels from the vehicle and inspect them for damage, cracks or corrosion.

ALLOY WHEELS

Alloy wheels should be regularly cleaned of all foreign matter, such as dirt and mud as a build up can affect the balance of the wheel, and may cause vibrations and uneven tyre wear.

The alloy wheels are coated with a clear protective finish. Do not use abrasive cleaner, polishing compounds, steel wool etc. when cleaning the wheels. Only mild soap and warm water are recommended. All alloy wheels are susceptible to corrosion damage, particularly if exposed to salt water.

Being relatively soft in comparison to steel wheels, alloy wheels are easily scuffed, however, this will not affect the serviceability of the wheel. Wheels that are buckled or cracked should be repaired or renewed.



Minor cracks and buckles can be repaired by a wheel specialist.

TYRES

Regularly inspect the tread of the tyres for signs of uneven wear. If uneven wear is apparent, refer to the Tyre Wear Trouble Shooting heading in this chapter for possible causes and cures. Also check the tread, grooves and sidewalls for nails, stones, etc. Where detected, these should be removed from the tyre and if necessary, the puncture repaired.

The air pressure in the tyre is the single most important aspect of tyre care. Too little or too much air pressure in the tyre can cause rapid wear or complete failure through overheating. Where possible, the tyre pressures should be checked and adjusted when the tyres are cold.

PRESSURE CONVERSION TABLE	
psi	15 20 25 30 35 40 45 50 55 60 65 70
kPa	100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500

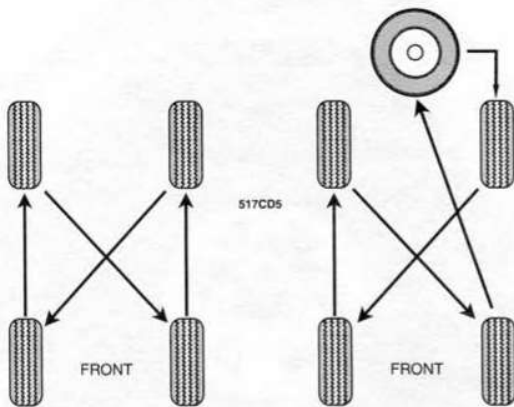
The tyre valves should always have caps installed, be regularly cleaned of dirt or dust and be inspected for leaks or damage every time the tyre pressures are checked.

To preserve tyre life, it is a good policy to periodically have the wheels balanced and the wheel alignment checked on a wheel alignment machine.

The wheel and tyre assemblies may be rotated periodically, if desired. Rotation of the wheels and tyres will increase the period between tyre renewal, but it is not essential for safe operation of the vehicle.



When the tyre groove depth is less than 1.6mm, or when the tyre is worn to the point where the tyre indicators are level with the tread surface, the tyre should be renewed.



Tyre rotation diagram.

As a rule, different tyre types, tread patterns or sizes should never be used on the vehicle at one time. All the tyres on the vehicle, including the spare, should be a matched set to prevent the vehicle behaving erratically under certain conditions. Under no circumstances mix radial ply and cross ply tyres.

Trouble Shooting

ABNORMAL WEAR ON BOTH SIDES OF TREAD

- 1 Under inflation of tyres: Check and inflate to the recommended pressures.
- 2 Overloading: Reduce the maximum loading.



ABNORMAL WEAR IN CENTRE OF TREAD

- 1 Over inflation of tyres: Check and reduce to the recommended pressure.



ABNORMAL WEAR ON INSIDE OF TREAD

Front tyres

Wheels toeing out: Check the front wheel alignment.

TIP If the wheels have too much toe out, both front wheels will have wear on the inside of the tread.

- 2 Excessive negative camber angle: Check the front wheel alignment.
- 3 Sagging front coil springs: Check and renew the faulty springs.
- 4 Loose or worn front hub bearings: Check and renew the worn hub bearings.
- 5 Loose or worn suspension components: Check and renew the faulty components. Align the front wheels.
- 6 Bent steering knuckle: Check and renew the steering knuckle.

Rear Tyres

- 1 Collapsed rear axle bearing: Check and renew the rear axle bearing as necessary.
- 2 Spring sag: Check the spring height and if necessary renew the spring.
- 3 Loose, worn or bent suspension or axle components: Check and renew faulty components as necessary.

ABNORMAL WEAR ON OUTSIDE OF TREAD

Front Tyres

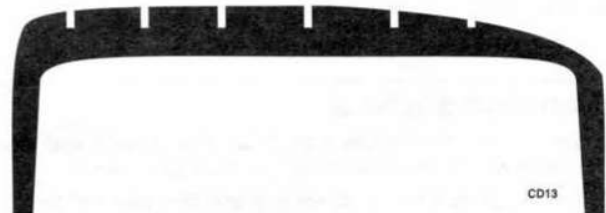
- 1 Front wheels have excessive toe in: Check the front wheel alignment.
- 2 Excessive positive camber angle: Check the front wheel alignment.
- 3 Excessive speed when cornering: Revise driving habits.



If the wheels have too much toe in, both tyres will have wear on the outside of the tread.

Rear Tyres

- 1 Loose, worn or bent suspension or axle components: Check and renew the faulty components as necessary.
- 2 Collapsed rear axle bearing: Check and renew the rear axle bearing as necessary.



UNEVEN OR IRREGULAR WEAR

- 1 Static or dynamic unbalance of the wheel and tyre assembly: Check and balance the wheel and tyre assembly.
- 2 Lateral runout of wheel: Check and true up or renew the wheel.
- 3 Faulty suspension unit or shock absorber: Renew the suspension unit or shock absorber as necessary.
- 4 Excessive play in the hub bearing: Check and renew the faulty hub bearings.
- 5 Excessive play in the front suspension ball joints: Check and renew the ball joints.

326 | Wheels and Tyres

LIGHTLY WORN SPOTS AT CENTRE OF TYRE

- 1 Static or dynamic unbalance of the wheel and tyre assembly: Check and balance the wheel and tyre assembly.
- 2 Radial runout (eccentricity) of wheel: Check and renew the wheel if necessary.

FLAT SPOTS AT CENTRE OF TREAD

- 1 Repeated severe brake application: Revise driving habits.
- 2 Lack of tyre rotation: Periodically rotate the wheel and tyre assembly.

HEEL AND TOE WEAR (SAWTOOTH EFFECT)

- 1 Overloading: Revise the maximum loading.
- 2 High speed driving: Avoid as far as possible.
- 3 Excessive braking: Revise driving habits.

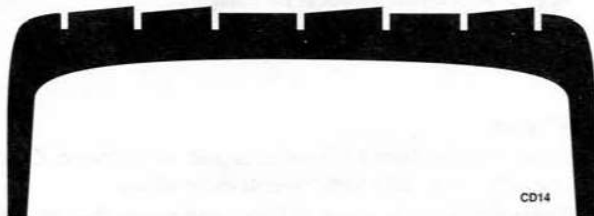
FEATHERED EDGE ON SIDE OF TREAD PATTERN

Front Tyres

- 1 Sharp inside edge: Excessive toe in. Check and adjust the wheel alignment.
- 2 One tyre sharp inside edge, other side sharp outside edge: Check for a bent steering knuckle or tie rod and renew.

Rear Tyres

- 1 Worn shock absorbers: Check and renew shock absorbers as necessary.
- 2 Loose or worn suspension bushes: Check and renew the faulty bushes as necessary.



- 3 Bent control arm: Check and renew control arm as necessary.
- 4 High speed driving: Avoid as far as possible.

Changing a Wheel

- 1 Ensure that the vehicle is on firm, level ground and clear from any passing traffic. Switch on the hazard lamps.
- 2 Firmly apply the handbrake, place the transmission in Reverse gear on manual transmission models, or Park, on automatic transmission models. Ensure that the transfer case is not in Neutral.
- 3 Ensure that all passengers are out of the vehicle and chock the wheel diagonally opposite the wheel to be changed.
- 4 Remove the jack and tools from the storage location. Remove the spare wheel from the tailgate and place it in close proximity to the wheel being changed.
- 5 If the wheel nuts are not exposed, remove the wheel cover or centre cap from the wheel being changed, using the tapered end of the wheel spanner.
- 6 Install the wheel spanner to the wheel nut so that the handle end of the spanner is horizontal and to the left hand side of



Chock the front and rear of the wheel diagonally opposite the wheel being changed.

the wheel. Apply pressure to the end of the spanner handle in an anticlockwise direction and loosen the wheel nut half a turn. Carry out the above procedure on the remaining wheel nuts.

- 7 Install the jack to the relevant jacking point and raise the vehicle slightly.
- 8 Ensure that the jack is correctly positioned (see illustrations) and stable.
- 9 Raise the vehicle so that the tyre clears the ground. Allow enough clearance between the tyre and the ground for the spare wheel to be installed.

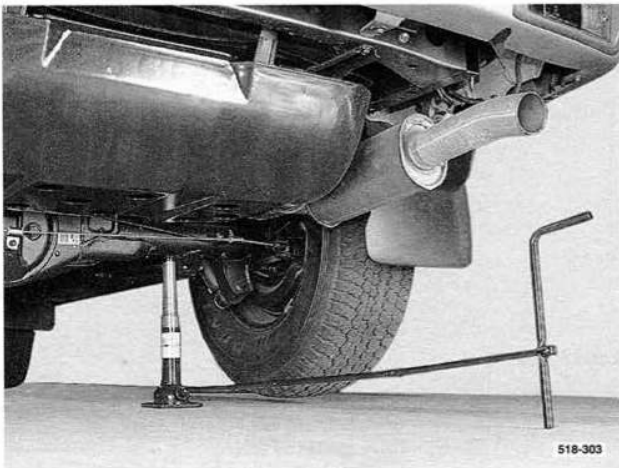


Under no circumstances get under the vehicle while the jack is the only means of support.

- 10 Remove the wheel nuts and withdraw the wheel from the vehicle. Alloy wheels which become seized to the hub may be freed by hitting the tyre with a rubber mallet. The spare wheel could be used to bump the seized wheel alternately at the front and rear. Use care not to dislodge the vehicle from the jack.



To loosen the wheel nuts apply pressure to the end of the spanner handle in an anticlockwise direction.



Vehicle jack positioned correctly at the rear of the vehicle.



Vehicle jack positioned correctly at the front of the vehicle.

- 11 Prior to installing the wheel, ensure that the mounting surfaces are clean and free from corrosion, dirt etc.
- 12 Install the spare wheel to the vehicle. Align the holes in the wheel with the studs prior to lifting the wheel to facilitate installation. If necessary, use the handle of the wheel spanner as a lever under the tyre and guide the wheel onto the studs.
- 13 Holding the wheel in position, install the wheel nuts with the taper facing the wheel and tighten in a diagonal sequence as much as possible using the wheel spanner.
- 14 Lower the vehicle to the ground and remove the jack from under the vehicle.
- 15 Using a torque wrench or a wheel spanner, tighten the wheel nuts in a diagonal sequence. Repeat the above procedure several times until the wheel nuts are tightened to 113 Nm.



It is important to tighten the wheels evenly in the correct sequence to the specified torque, to prevent the possibility of distorting the hub and/or brake disc, resulting in a shudder through the vehicle.

- 16 Where removed, install the wheel cover or centre cap to the spare wheel. Remove the chocks and install the wheel, jack and tools to their respective storage positions.
- 17 As soon as possible, have the tyre repaired. Check the wheel nut tension again after the vehicle has travelled a short distance. If unsure of the tightness of the wheel nuts, have them checked at the nearest service station.
- 18 Check the tyre pressure of the spare wheel before driving long distances.