

British Standard Automobile Series

Tyres and wheels

Part 2. Wheels and rims

Section 7. Code of practice for the selection and care of wheels for commercial vehicles

Série automobile. Pneumatiques et roues

Partie 2. Roues et jantes

Section 7. Choix et entretien des roues pour véhicules utilitaires — Code de bonne pratique

Kraftfahrzeugserie. Reifen und Räder

Teil 2. Räder und Felgen

Abschnitt 7. Leitfaden für die Auswahl und Pflege von Rädern für Nutzfahrzeuge

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Foreword

This Section of BS AU 50 has been prepared under the direction of the Automobile Standards Committee and gives guidance to vehicle manufacturers on the initial steps to be taken in selecting wheels for commercial vehicles. Descriptions and drawings of wheels and rims in general use are also given as well as recommendations on the care of wheels, which if followed would lead to improved road safety.

The data in this code of practice are based on The Society of Motor Manufacturers and Traders Ltd. Information sheet number TW-7A.

Tyre, wheel, rim and valve requirements are given in the following Parts and Sections of BS AU 50 : Tyres and wheels.

Part 1 Tyres

- Section 0 General
- Section 1 Car tyres
- Section 2 Commercial vehicle tyres
- Section 3 Off-the-road tyres
- Section 4 Agricultural vehicle tyres
- Section 5 Industrial vehicle tyres
- Section 6 Motor cycle and scooter tyres

Part 2 Wheels and rims

- Section 0 General (including terms and definitions, and construction and workmanship)
- Section 1 Rim profiles and dimensions (including openings for valves)
- Section 2 Specification for dimensions of wheel naves and hub centres for commercial vehicles
- *Section 3 Wheel and hub studs and nuts, and bolts
- Section 4 —
- Section 5 Road wheels manufactured wholly or partly of cast light alloy for passenger cars
- Section 6 Specification for road wheels manufactured wholly or partly of light alloy for mopeds and motor cycles
- Section 7 Code of practice for the selection and care of wheels for commercial vehicles
- Section 8 Code of practice for the selection and care of wheels for passenger cars (including caravans and light trailers)

Part 3 Valves

- Section 1 Valve dimensions
- Section 2 Tyre valve threads 5V1, 5V2, 6V1 and 8V1
- Section 3 Tyre valve threads 9V1, 10V2, 12V1 and 13V1
- Section 4 Tyre valve threads 8V2, 10V1, 11V1, 13V2, 15V1, 16V1, 17V1, 17V2, 17V3, 19V1 and 20V1
- Section 5 Dimensions for ISO core chamber No. 1 for tyre inflation valves
- Section 6 Dimensions for ISO core chamber No. 2 for tyre inflation valves

Compliance with a British Standard does not of itself confer immunity from legal obligations.

7.1 Scope

This Section of BS AU 50 : Part 2 gives recommendations for vehicle manufacturers on the initial steps to be taken in selecting wheels for commercial vehicles and recommendations on the care of wheels for the user. Descriptions of the principal types of wheels and attachments, the sequence of attachment stud tightening and the checking procedures to be carried out when fitting wheels to vehicles are also given.

NOTE 1. Appendix A gives the principal types of rims and wheels used in the UK. For further details see BS AU 50 : Part 2 : Sections 0, 1 and 2.

NOTE 2. The titles of the publications referred to in this standard are listed on the inside back cover.

7.2 Tyre and rim selection

When selecting a tyre and rim for a vehicle it is important to ensure that the correct choice is made. The initial choice is the tyre. Basic factors which influence this choice are:

- (a) load carrying capacity;
- (b) conditions of service and operational use.

The basic tyre choice is between tube type or tubeless tyres and between diagonal or radial tyres.

The complete tyre specification, including the rim profile, should be agreed between the tyre, wheel and vehicle manufacturers.

NOTE. Information on tyre sizes, inflation pressures and axle loads is given in BS AU 50 : Part 1 : Section 2. Rim data are given in BS AU 50 : Part 2 : Sections 0 and 1.

7.3 Wheel selection

It is important that the selection of the type of wheel should be by agreement between the vehicle manufacturer and the wheel and tyre manufacturers.

Factors affecting wheel selection are:

- (a) compatibility with the vehicle type, design and performance requirements;
- (b) compatibility with the vehicle for installation, i.e. ensuring the correct wheel to hub attachment, and the type of stud and nut fixing. Also that the wheel has adequate clearance around the vehicle brake and hub, the steering mechanism and the body parts;
- (c) compatibility with the tyre for rim profile, valve fitment, offset and, where required, for dual (twin) type assembly, that the wheel has the correct half dual spacing (offset) for the selected tyre size.

*To be prepared.

SAFETY NOTE. It is emphasized that only the rim profiles are designated in the tyre size and load tables of BS AU 50. These are not to be used for the rim or wheel strength characteristics. It is essential that wheel strength characteristics are agreed between the vehicle, wheel and tyre manufacturers.

7.4 Types of flanges and locking rings

NOTE. Appendix B gives typical sections of the types of flanges, spring flanges and locking rings for use with the rims and wheels in appendix A.

The endless flanges, spring flanges and locking rings for flat base, semi drop centre (SDC) and wide base rims illustrated in appendix B are not interchangeable. The correct size and type of locking ring, endless flange and spring flange for the rim should always be used as serious accidents could result from the wrong application.

It is essential that endless flanges, spring flanges, locking rings and rims from different manufacturers should not be inter-mixed.

When the tyre is fitted for inflation with the spring flange (two-piece rim) or locking ring (three/four-piece rim) in its correct position in the rim gutter, it is essential that the ends of the ring should not be touching as this will prevent correct seating.

7.5 Removing and fitting tyres

It is essential that the comprehensive tyre removal and fitting procedures given in the British Rubber Manufacturers' Association (BRMA) *Service Manual for Truck Tyres*, BRMA wall charts and the data books of the tyre manufacturers* should be followed if accidents are to be avoided and optimum tyre and wheel performances are to be achieved.

It is essential that the use of moist or contaminated air should be avoided for the inflation of tyres, as moist or contaminated air can cause corrosion of the rim, leading to possible wheel failure.

7.6 Wheel checks

The condition of wheels should be checked regularly in accordance with the vehicle servicing schedule. Particular attention should be paid to the following points.

- (a) Examine the wheel and replace any damaged, pitted or distorted parts. Scrap any discarded parts.
- (b) Check that the flanges and locking rings are of the correct make, type and dimensions.
- (c) Before refitting remove all traces of corrosion (rust) from the flanges, gutter and rim base to ensure the correct seating of parts and to prevent the formation of cracks.

(d) After derusting repaint the wheels. Ensure that the thickness of paint on all mating surfaces including nut seats is minimal. Check that the paint is dry before the parts are assembled or the wheel is fitted to a vehicle.

(e) When the wheel and tyre have been reassembled, and before inflation, check the positioning of loose flanges and locking rings.

(f) Ensure on four-piece rims that the inner loose flange is fitted correctly.

(g) Do not repair or weld damaged or distorted wheels and parts (welds crack under dynamic stress).

SAFETY NOTE. Attempts to weld wheels with tyres still in position, even when the tyre is deflated, can result in an explosion. Therefore under no circumstances should welding be undertaken on a wheel for any purpose whatsoever.

7.7 Wheel mounting checks

The condition of the wheel mounting should be checked regularly in accordance with the vehicle servicing schedule. Particular attention should be paid to the following points.

- (a) Check the studs for thread stretch and wear on the cones. Worn cones can lead to loose wheel nuts and poor location of an inner twin wheel.
- (b) Ensure that all the studs are correctly and tightly seated into or affixed into the hub before fitting the wheel.
- (c) Ensure that the nuts run freely on the threads. Light oil may be used sparingly on the threads of the nut only.
- (d) Manufacturers' recommendations on the use of lubricants vary and lubricants influence tightness for a given torque. Observe the particular vehicle manufacturer's recommendations on the use of lubricants.
- (e) Ensure that the spigot, wheel bore, mating hub or drum and wheel faces are clean before fitting spigot type wheels. Smear the wheel bore with anti-seize compound if directed by the vehicle manufacturer. Ensure that the mating hub or drum and nave faces are clean before fitting conical and spherical seating wheels.
- (f) Ensure that inflation valves are correctly aligned and accessible when fitting twin wheels.

7.8 Securing the wheel to the vehicle

7.8.1 The dangers of incompatible wheel fixings

Most commercial vehicle wheels currently fitted to UK vehicles have conical stud hole seatings, which mate with the matching tapers of the wheel stud collar and wheel nut, to both centralize and support the wheel on the vehicle.

Some European commercial vehicles have a similar type of wheel mounting but the seating is spherical, which is funda-

*BRMA publications may be obtained from the British Rubber Manufacturers' Association, 90-91 Tottenham Court Road, London W19 0BR (Telephone: 01 580 2794).

mentally different from the UK conical seating. It is essential that UK (conical seating) and European (spherical seating) wheels should not in any circumstances be interchanged, even though it is physically possible, because the conical and spherical seatings do not mate together and loose wheels and broken studs, with their attendant dangers, are the likely result.

Many commercial vehicles use a spigot mounted fixing for the wheels, where the wheel is centralized by the close fit of the wheel centre bore on the hub spigot. With this type of mounting the wheel has plain stud holes and flat faced nuts (with captive washers) clamp the wheel to the hub face.

It is essential that the wheel nuts and seatings should be checked for compatibility to avoid incorrect matching. Figure 1 shows typical wheel fixings for conical seating, spherical seating and spigot mounting. (See BS AU 50 : Part 2 : Section 2 for dimensions.)

It is essential that the conical or spherical locating stud or washer used on the inside of dual (twin) wheels should not be fitted to the inside (next to the hub) of a single wheel fixing.

There are two types and thicknesses of spherical washers. The thick split type is for use on the outside of twin wheels and the thin solid washer is for use on the inside. It is essential that these washers should be used in the correct location, otherwise distortion of the wheel will occur.

7.8.2 Wheel fitting and nut tightening procedure

It is essential when mounting wheels on the vehicle that they should all be centred correctly to avoid overstrained or fractured studs, distortion of the wheels, hub flanges and brake drums, loose wheels and elongated stud holes.

The vehicle should be jacked up so that the tyre clears the ground, then the wheel or twin wheels pushed home on the studs and all the nuts screwed on fingertight. (It should be checked that the inflation valve is correctly aligned and accessible when fitting twin wheels.) One nut should never be tightened completely while the others are still loose. The final tightening should be gradual and progressive, by giving a partial turn at a time to each nut in the sequence shown in figure 2.

The final tightening of the nuts should be with a torque wrench set to the vehicle manufacturer's recommended torque value. An air impact tool should never be used for the final tightening, and neither should extensions on wheel nut spanners and spiders as overtightening may occur,

resulting in stretched threads, broken studs and cracked wheels.

Following a wheel fitting the nuts should be rechecked for tightness, by hand, using the recommended torque wrench and torque values, after the vehicle has travelled approximately 50 km (or the distance recommended by the vehicle manufacturer). Nuts should also be checked for tightness at the normal service intervals.

7.9 In-service wheel checks

During normal vehicle use the wheels should be examined regularly for signs of looseness. Looseness is usually seen by rust marks around the stud holes and by signs of fretting. In addition the wheels should be examined for cracks and distortion. If cracks are found the tyre should be deflated by removing the valve core before removing the wheel from the vehicle (in the case of dual tyres both tyres should be deflated). It is essential that cracked wheels or wheels with deformed bolt holes should be removed and scrapped. Damaged wheels should not be repaired for reuse.

7.10 Removing wheel from vehicle

Before commencing removal of the wheel from a vehicle, the tyre and the wheel should be carefully examined for defects and damage. (For further details see the publications referred to in 7.5.)

In the event of difficulty in removing a wheel from a hub or drum, under no circumstances should direct hammer blows be made to the wheel rim. A protective block of wood or a rubber faced mallet should be used with caution.

With divided type wheels it is essential that the outer clamping nuts should not be loosened or unscrewed. These are coloured as follows:

- red for wheels painted in colours other than red
- yellow for wheels painted red.

Before removing divided wheels from the vehicle the tyres should be deflated by removing the valve core.

If there are signs that a tyre has run substantially deflated, or has stood in a deflated condition, wheel components may have become damaged or displaced. In which case the assembly should be removed from the vehicle and stripped and each part should be examined and corrected/treated before being reassembled.

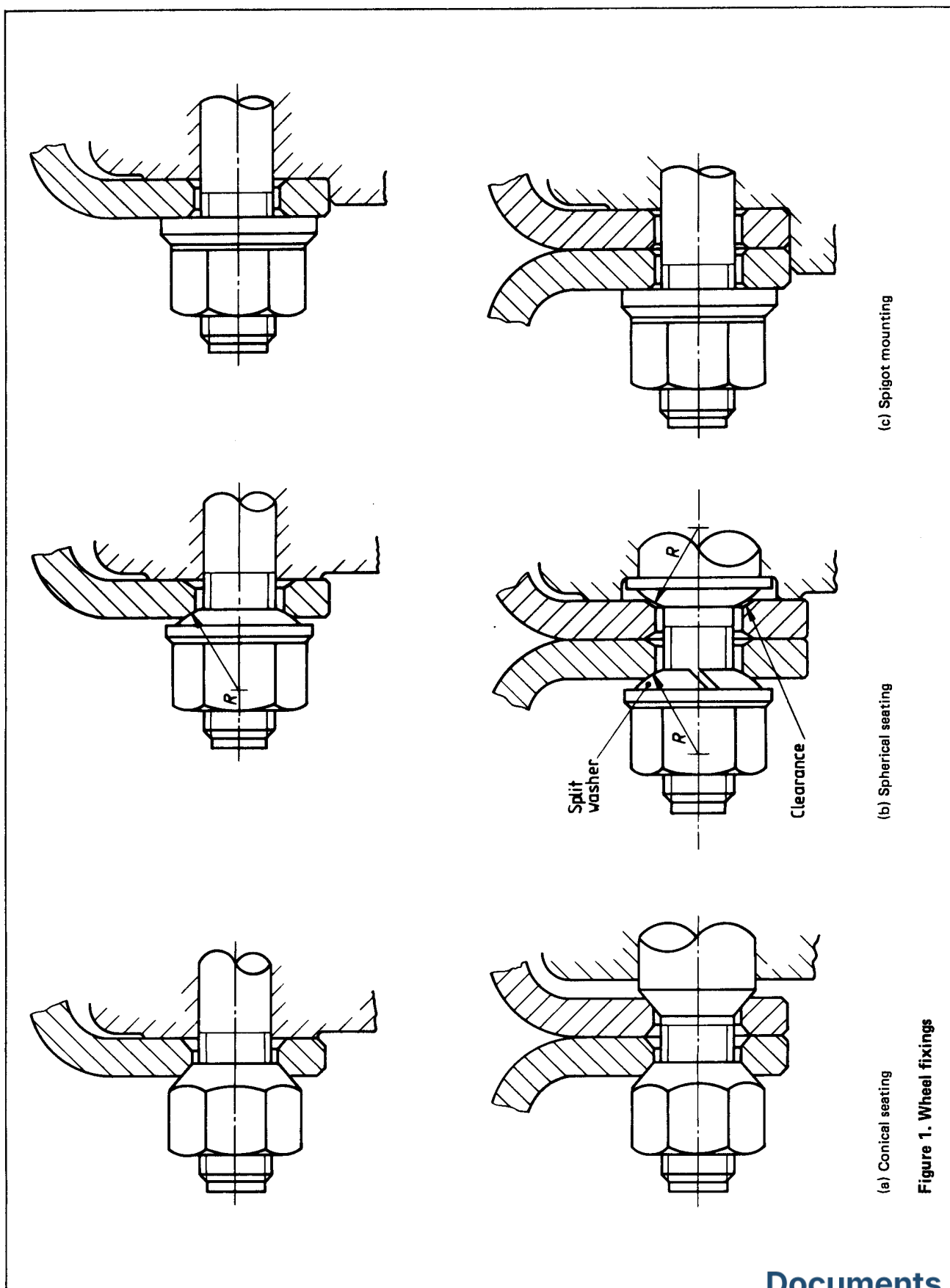
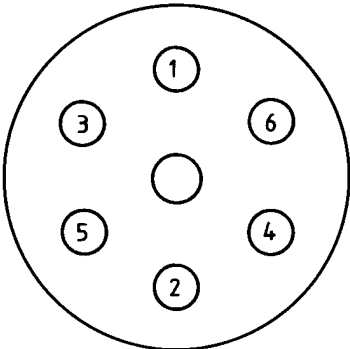
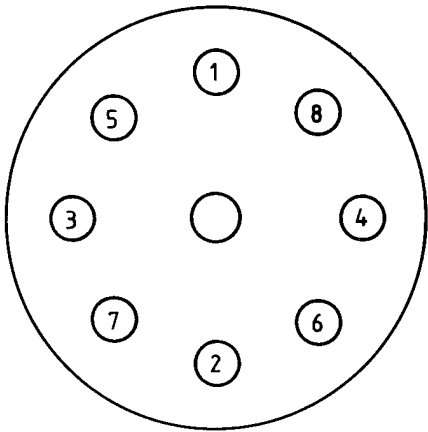


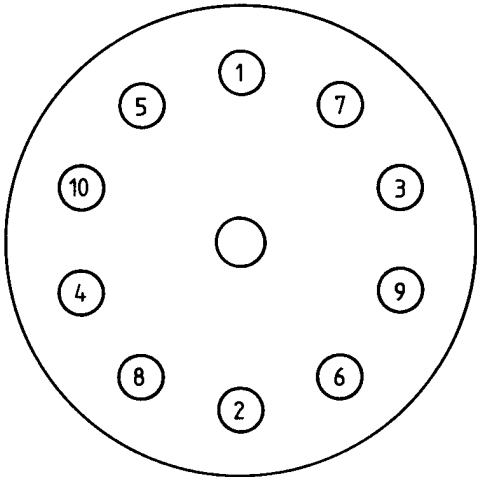
Figure 1. Wheel fixings



(a) Six-stud mounting



(b) Eight-stud mounting



(c) Ten-stud mounting

Figure 2. Sequence of stud tightening