



BSI Standards Publication

**AUTOMOBILE SERIES - Tyres and wheels
- Part 2: Wheels and rims - Section
7b: Code of practice for the selection
and care of tyres and wheels for
commercial vehicles**

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Summary of pages

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Foreword

Publishing information

This Section of BS AU 50 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 August 2017. It was prepared by Technical Committee AUE/4, *Tyres and wheels for motor vehicles*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This Section of BS AU 50 supersedes BS AU 50-2.7a:1995, which is withdrawn.

Information about this document

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

- a) Part 1: Tyres;
- b) Part 2: Wheels and rims;
- c) Part 3: Valves; and
- d) Part 4: Rim profiles and dimensions.

Use of this document

As a code of practice, this Section of BS AU 50 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this Section of BS AU 50 is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this Section of BS AU 50 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of The Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This Section of BS AU 50 gives recommendations on the steps to be taken in selecting replacement tyres and wheels for commercial vehicles and on the care of tyres, wheels and wheel fixings. It describes the principal types of wheels and fixings and the procedures to be carried out when fitting wheels.

The types of fixings and sizes described in this British Standard are normally used on heavy commercial vehicles, but if used on other types of vehicle then the recommendations given in this standard also apply.

NOTE 1 Recommendations for the selection and care of wheels for passenger cars and light trailers are given in BS AU 50-2.8a.

NOTE 2 Attention is drawn to the Road Vehicles (Construction and Use) Regulations 1986 [1].

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS AU 50-2.3, *Tyres and wheels – Part 2: Wheels and rims – Section 3: Specification for road-wheel nuts, studs and bolts for commercial vehicles*

3 Tyre and wheel selection

The initial choice of tyre and wheel combination and the arrangement at the particular wheel position should be made by the vehicle manufacturer in accordance with published performance and application data.

Where a vehicle's wheel and/or tyre specification is changed after manufacture, e.g. by body builders, operators or specialist converters, this should be done in consultation with both the vehicle and wheel manufacturer and having regard to the following factors:

- a) tyre/wheel load carrying capacity (design and legal restrictions);
- b) maximum speed of use;
- c) dimensional constraints, e.g. overall vehicle height, ground clearance, legal overall vehicle width, steering lock angle and suspension travel;
- d) compatibility with existing axles, hubs, brake assemblies and suspension;
- e) operation and service conditions; and
- f) application of wheel/tyre assembly, e.g. steered axle, drive axle, free rolling axle or twin wheel.

NOTE Notes on tyre sidewall markings are given in [Annex A](#). Types of rims and wheels are described in more detail in [Annex B](#).

4 Tyre selection

COMMENTARY ON CLAUSE 4

The tyre is the component which links the vehicle with the road surface under all conditions. Its major functions which have a significant influence on the safety of the vehicle can be summarized as follows:

- *load carrying;*
- *cushioning;*
- *transmission of drive and braking forces; and*
- *steering and handling response.*

The tyre should be capable of carrying the maximum authorized load on the axle to which it is to be fitted at the vehicle's legal maximum speed.

Any tyre chosen as a replacement should normally be of the same size, construction and service description as the original equipment. The vehicle and tyre manufacturers' data should be consulted when a tyre other than that supplied as standard with the vehicle is to be used or if the application of the vehicle is likely to be changed.

A tyre should be defined by the following:

- a) size designation comprising section width, aspect ratio and rim diameter;
- b) construction – normally radial but less frequently cross ply or bias belted;
- c) type of tread pattern according to individual manufacturer's designation; and
- d) service description – load index and speed symbol (see BS AU 50-1.2.1b and/or the ETRTO Standards Manual [2] for details).

NOTE Older tyres might not have a speed symbol and could carry a ply rating instead of a load index.

If any of these factors is to be altered, the suitability of the wheel for the amended tyre specification should also be verified and the factors listed in Clause 3 a) to f) should be taken into account.

5 Wheel selection

5.1 General

The factors affecting wheel selection are those listed in Clause 3 a) to f). Any wheel chosen as a replacement should be suitable for the application and normally of the same type, size, rim section, offset and fixing system as the original equipment.

Wheels specifically designed for conical or spherical seating should never be used on hubs designed for spigot fixing.

NOTE 1 Some replacement wheels have been produced which are designed to be used in a "dual purpose" mode. The hub bore is dimensioned to suit spigot fixing but the stud holes are profiled to suit either DIN spherical or BS conical fixing nuts. The use of these wheels is not recommended by this British Standard.

NOTE 2 Variations in the piercing or venting patterns in the wheel disc when mixed on one vehicle are permissible provided that access to the tyre valves on dual (twin) wheels is maintained and brake cooling is not impaired.

Any variation in wheel specification from the original should be verified with both the vehicle and wheel manufacturer and/or the factors listed in Clause 3 a) to f) checked.

When it is proposed to fit replacement wheels where the material type (e.g. steel, cast iron, aluminium alloy), nave thickness or nave contour varies from the original, the suitability of the fixing system should be carefully evaluated.

In particular, the following points should be checked:

- a) compatibility of the fixings (see Clause 6);
- b) stud length (where nave thickness has changed);
- c) clearance around brake, hub and steering components;
- d) fitment and alignment of tyre valves on single and dual wheel arrangements; and
- e) half dual spacing or offset for the tyre size to give proper clearance when wheels are twinned or to maintain normal steering characteristics on steer axles.

NOTE 3 [Annex B](#) lists the types of rims and wheels in general use and these are illustrated in [Figure B.1](#) to [Figure B.4](#). For detailed descriptions of offsets, see [B.2](#).

5.2 Fitting of single wheels in place of twin wheels and the use of spacers

Where single wheels are fitted as replacements for twin wheels, additional attention should be given to the wheel fixings. If the original studs or bolts have plain shanks which are too long for the nuts to tighten on to the wheel or if the projecting length of the studs or bolts would adversely affect the fitting of socket spanners, suitable replacement studs or bolts should be fitted (see [7.4](#)).

If spacers are used to compensate for the absence of the inner wheel, such spacers should be of grades of steel or cast iron of a hardness not less than HV150. They should be accurately machined with an outside diameter not exceeding that of the wheel mounting face on the hub or brake drum and be free from sharp edges. The combined thickness of the spacer and the single wheel should be equal to the thickness of the original twin wheel assembly.

5.3 Fitting aluminium wheels in place of steel wheels

For spigot located wheels, there should be adequate location between the wheel and hub spigot or pilot tabs, particularly for the outer wheel on twin wheel installations. If in doubt, this should be checked with both the vehicle and wheel manufacturer.

Stud length should be sufficient to allow the full engagement of a standard wheel nut plus a suitable margin. Alternatively, appropriate sleeved nuts may be used in combination with wheels with correspondingly-sized mounting holes.

In the case of twinning alloy with steel wheels, particular care should be taken to ensure that both wheels match with respect to wheel size and offset, wheel load index and tyre service description and tread depth. All recommendations in [7.4](#) d) and f) regarding matching twin wheel installations are applicable to a mixed fitment, in particular the need to avoid excessive build-up of paint on the inner steel wheel.

Alloy wheels should be fitted with suitable valves.

NOTE Valves for steel wheels might not be geometrically compatible with alloy wheels and the materials used can cause accelerated corrosion of the valve or alloy wheel.

In certain applications alloy wheels might suffer increased rim flange wear in relation to steel wheels. In order to reduce the risk of injury or tyre damage, sharp edges should be removed in accordance with the wheel manufacturer's recommendations. Wheels with excessive rim flange wear should be removed from service.

Alloy wheels might be subject to rapid corrosion by some types of commonly-used products such as tyre fitting lubricants, puncture sealants or balancing liquids; this should be checked with the wheel manufacturer before use.

6 Wheel fixings

COMMENTARY ON CLAUSE 6

The majority of modern heavy commercial vehicles use spigot located 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 to clamp the wheel to the hub face.

Older United Kingdom vehicles (and some modern light commercial vehicles) have conical stud hole seatings that mate with the matching tapers of the wheel nuts both to centralize and support each wheel. On dual (twin) wheels the inner wheel is centralized by and supported on a tapered collar or tapered split washer on the wheel stud shank.

Older types of European commercial vehicles have a similar type of wheel mounting but the seating is spherical which is fundamentally different from the UK conical seating. It is essential that these UK (BS conical seating) and European (DIN spherical seating) wheels are not in any circumstances interchanged even though it is physically possible and they appear to be compatible. The conical and spherical components do not mate together and, if combined, loose wheels result.

The wheel nuts and seatings should be checked to ensure that they are compatible to avoid incorrect matching.

NOTE [Figure 1](#) shows typical wheel fixings for conical seating, spherical seating and spigot mounting.

7 Care and maintenance of wheels and tyres

7.1 General

COMMENTARY ON 7.1

The care and maintenance of wheels, wheel fixings and tyres falls into three areas as follows:

- a) *routine and special checks carried out by the driver(s) or other designated persons (see [7.2](#));*
- b) *periodic inspections by vehicle maintenance staff as part of the vehicle maintenance schedule (see [7.3](#)); and*
- c) *inspections by maintenance staff or specialist tyre fitters when tyres are changed or when wheels are removed for any other reason (see [7.4](#)).*

If there are signs that a tyre has substantially deflated or has stood in a deflated condition, the tyre and/or wheel components might have become damaged or displaced. The assembly should be removed from the vehicle and the tyre removed from the wheel. The tyre should be examined to determine the reason for deflation and whether it is suitable for further service. Each component part of the wheel should also be examined and replaced as necessary before being reassembled.

In the case of aluminium alloy wheels, excessive heat from fire, brake malfunction, wheel bearing failure, tyre failure or other sources might weaken the metal and render the wheel unserviceable. Any wheel that has been subject to excessive heat should be immediately removed from service.

Any wheel found loose at inspection should be removed and the fixings, wheel and hub checked for wear and damage.

The wheel fitting procedure given in Clause [8](#) should be followed when remounting.