

Tyres and wheels —

Part 2: Wheels and rims —

Section 7a: Code of practice for the selection and care of tyres and wheels for commercial vehicles

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee AUE/4, Tyres and wheels for motor vehicles, upon which the following bodies were represented:

- Agricultural Engineers' Association
- Automobile Association
- British Industrial Truck Association
- British Pressure Gauge Manufacturers' Association
- British Rubber Manufacturers' Association
- Confederation of Passenger Transport UK
- Department of Transport
- Freight Transport Association
- Institute of Road Transport Engineers (Inc)
- Motor Cycle Industry's Association of Great Britain Ltd.
- Motor Industry Research Association
- National Tyre Distributors' Association
- Retread Manufacturers' Association
- Road Haulage Association Ltd.
- Society of Motor Manufacturers and Traders Ltd.

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 December 1995

© BSI 03-1999

First published March 1987
Second edition December 1995

The following BSI references relate to the work on this standard:
Committee reference AUE/4
Draft for comment 95/701902 DC

ISBN 0 580 25160 8

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
7.1 Scope	1
7.2 References	1
7.3 Tyre and wheel selection	1
7.4 Tyre selection	1
7.5 Wheel selection	2
7.6 Wheel fixings	2
7.7 Care and maintenance of wheels and tyres	3
7.8 Wheel fitting and nut tightening procedure	7
Annex A (informative) Bus and truck tyre sidewall markings	9
Annex B (informative) Types of rims and wheels	11
Annex C (informative) Types of flanges, spring flanges and locking rings	19
Figure 1 — Wheel fixings	4
Figure 2 — Sequence of stud tightening	8
Figure A.1 — Bus and truck tyre sidewall markings	9
Figure B.1 — Wide base rims	12
Figure B.2 — Flat base rims	13
Figure B.3 — Semi drop centre (SDC) rims	14
Figure B.4 — 15° drop centre rims	15
Figure B.5 — 5° well base rim	15
Figure B.6 — Divided rim	16
Figure B.7 — Earlier and later types of tubeless wheels	17
Figure B.8 — Single wheel offset	18
Figure B.9 — Dual (twin) wheel offset or half dual spacing	18
Figure C.1 — Cross-sections of typical flanges and locking rings	20
Table A.1 — Load index values	10
Table A.2 — Speed symbol values	10
List of references	Inside back cover

Foreword

This Section of BS AU 50 has been prepared by Technical Committee AUE/4, and gives guidance to vehicle users on the selection of replacement tyres and wheels for commercial vehicles and on the care of tyres, wheels and wheel fixings. It is a revision of BS AU 50-2.7:1987, which is withdrawn.

This revision updates the recommendations given in the 1987 edition to take account of developments in design and practice, and provides more detailed guidance in respect of care and maintenance.

As a code of practice, this British Standard 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.

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

- *Part 1: Tyres;*
- *Section 0: General;*
- *Section 1: Car tyres;*
- *Section 2: Commercial vehicle tyres;*
- *Section 3: Off-the-road tyres;*
- *Section 4: Agricultural tractor and machine tyres;*
- *Section 5: Industrial vehicle tyres;*
- *Section 6: Motorcycle tyres;*
- *Section 7: Moped tyres;*
- *Section 8: Code of practice for the storage of tyres, inner tubes and flaps.*
- *Part 2: Wheels and rims;*
- *Section 0: General (including terms and definitions, and construction and workmanship);*
- *Section 1: (Withdrawn);*
- *Section 2: Specification for dimensions of wheel naves and hub centres for commercial vehicles;*
- *Section 3: Specification for road-wheel nuts, studs, and bolts for commercial vehicles;*
- *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 1a: Specification for 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;*
- *Section 7: Code of practice for the selection and care of tyre inflation valves for passenger cars (including caravans and light trailers);*

- *Section 8: Code of practice for the selection and care of tyre inflation valves for commercial vehicles.*
- *Part 4: Rim profiles and dimensions;*
- *Section 1: Car rims;*
- *Section 2: Commercial vehicle rims;*
- *Section 3: Off-the-road rims;*
- *Section 4: Agricultural tractor and machine rims;*
- *Section 5: Industrial vehicle rims;*
- *Section 6: Motorcycle rims;*
- *Section 7: Moped rims.*

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

7.1 Scope

This Section of BS AU 50-2 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 standard are normally used on heavy commercial vehicles, but if used on other types of vehicle then the principles upon which the recommendations given in this standard are based also apply.

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

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

7.2 References

7.2.1 Normative references

This Section of BS AU 50 incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this Section of BS AU 50 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

7.2.2 Informative references

This Section of BS AU 50 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

7.3 Tyre and wheel selection

The initial choice of tyre and wheel combination and the arrangement at the particular wheel position is 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 the vehicle 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;

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. Wheel types are described in more detail in Annex B.

7.4 Tyre selection

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;
- steering and handling response.

Primarily, 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.

NOTE 1 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 is 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;
- d) service description — load index and speed symbol (see BS AU 50-1.2.1 and/or the ETRTO Standards manual [2] for details).

NOTE 2 Older tyres may not have a speed symbol and may carry a ply rating instead of a load index.

NOTE 3 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 7.3 a) to f) should be considered.

7.5 Wheel selection

7.5.1 General

The factors affecting wheel selection are those listed in 7.3 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. 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 the vehicle manufacturer and/or the factors listed in 7.3 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, special consideration should be given to the suitability of the fixing system.

In particular, the following points should be checked:

- a) compatibility of the fixings see 7.6;
- 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 For detailed descriptions of offsets see B.2.

7.5.2 Wheel and rim designs

Annex B lists the types of rims and wheels in general use and these are illustrated in Figure B.1 to Figure B.9.

Annex C gives descriptions of the types of flanges and locking rings for use with the rims and wheels which are listed in Annex B, and cross-sections of typical flanges and locking rings are illustrated in Figure C.1. The endless flanges, spring flanges and locking rings for flat base, semi drop centre (SDC) and wide base rims illustrated in Figure C.1 are not interchangeable. The correct size and type should always be used as serious accidents can result from the wrong application.

It is essential that endless flanges, spring flanges, locking rings and rims from different manufacturers are not intermixed.

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 are not touching as this prevents correct seating.

WARNING 1. It is emphasized that only the rim profiles are designated in BS AU 50-4.2.1 and the withdrawn BS AU 50-2.1. While the rim profiles and dimensions may appear suitable the wheel strength may not be and should be determined before use.

WARNING 2. The use of replacement “dual purpose” wheels (see 7.6) is not recommended.

7.5.3 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, it is recommended that suitable replacement studs or bolts are fitted (see paragraph 2 of 7.7.4).

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. (See also BS AU 50-2.2.) The combined thickness of the spacer and the single wheel should be equal to the thickness of the original twin wheel assembly.

7.6 Wheel fixings

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 the wheel on the vehicle. 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.

It is vital to check that the wheel nuts and seatings are compatible to avoid incorrect matching. Figure 1 shows typical wheel fixings for conical seating, spherical seating and spigot mounting. See BS AU 50-2.2 for dimensional details.

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

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.

7.7 Care and maintenance of wheels and tyres

7.7.1 General

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 7.7.2);
- b) periodic inspections by vehicle maintenance staff as part of the vehicle maintenance schedule (see 7.7.3);
- c) inspections by maintenance staff or specialist tyre fitters when tyres are changed or when wheels are removed for any other reason (see 7.7.4).

If there are signs that a tyre has substantially deflated or has stood in a deflated condition, the tyre and/or wheel components may 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.

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 7.8 should be followed when remounting.

7.7.2 Routine in-service checks

During normal vehicle use tyres and wheels should be visually examined regularly (preferably at the start of each shift).

Tyres should be examined for damage, abnormal or excessive wear, under-inflation and foreign objects embedded in them or trapped between dual (twin) tyres.

Wheels should be checked for signs of damage, cracks, distorted rims, displaced spring flanges or locking rings, broken or loose fittings and signs of wheel looseness e.g. bright metal or rust marks in the area of nuts or captive washer seatings.

If looseness is suspected, the wheel nuts should be checked physically using the wheel nut wrench supplied with the vehicle by the vehicle manufacturer, or a socket and short bar of corresponding length.

Any defects, including loose wheel nuts, should be reported immediately and the vehicle should not be driven further without clear authority. If wheel fixings are loose, there is a reason. The wheel should be removed and all relevant components examined as soon as practicable.

WARNING. Retightening loose wheel nuts on the road (or anywhere else) without first ascertaining the reason for looseness and the extent of any wear or damage is potentially dangerous. Overtightening of wheel fixings (e.g. by using extension bars) can result in damage to fixings, wheels and hubs, the subsequent failure of which can result in wheel loss.

7.7.3 Periodic maintenance inspections

These inspections should be carried out regularly in accordance with the preventative maintenance schedule issued by the vehicle manufacturer which should incorporate the items listed in 7.7.2 but in greater depth, e.g. tyre pressure should be checked and adjusted as necessary to the correct value.