

Specification for

# Repairs to tyres for motor vehicles used on the public highway

# Committees responsible for this British Standard

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- Association of County Councils
- Automobile Association
- British Rubber Manufacturers' Association
- Bus and Coach Council
- Consumer Policy Committee of BSI
- Department of Transport
- National Tyre Distributors' Association
- Retread Manufacturers' Association
- Road Haulage Association Ltd.
- Royal Automobile Club
- Society of Motor Manufacturers and Traders Ltd.

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# Foreword

BS AU 159e has been prepared under the direction of the Automobile Standards Policy Committee. It was first published in 1972 and revised in 1973, 1981 and 1990. The associated wall charts, issued in 1974, were withdrawn in 1978. The standard was amended in 1994 to update the requirements for repair patches to account for increases in the highest inflation pressures of car and commercial vehicle tyres. The amended version supersedes BS AU 159d:1990 which is withdrawn.

As in the 1981 edition of the standard, it continues to be a requirement in this edition that repaired tyres and tubes are able to operate at their original speed and load capabilities. It also continues to be a requirement that punctured or damaged tyres are removed from their wheel rims for internal examination for secondary damage which, if ignored, could be a safety hazard. Therefore, neither plugs externally applied to fitted tyres, nor liquid sealants are recognized as acceptable repair methods.

Repairs for limited run-flat tyres and temporary use spare tyres are not included: reference should be made to the tyre manufacturer. Repairs to inner tubes are included but repairs for commercial vehicle steel diagonal (cross) ply tyres are not included as this type of tyre is considered obsolete.

The 1973 edition of this standard permitted the use of an inner tube to “repair” very small penetrations in tubeless tyres. This method was excluded from the 1981 edition and is not included in the present edition; instead, it is essential that a repair patch is applied to remake the tubeless feature of the tyre.

Good workshop practice for tyre repair is included with emphasis being given to the conditions during vulcanizing to ensure that the carcasses are cured in the relaxed shape.

In this edition the concept of major and minor repairs has been introduced. A major repair being one that requires a reinforced repair patch and a minor repair being one that requires a rubber only repair. It is also a requirement that all major repairs are identified and marked externally on the sidewall of the tyre in the vicinity of the repair, giving the repairer’s name or identification mark and the number of this standard, BS AU 159e. Marking is not required for minor repairs.

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.



## 0 Introduction

In the course of its life, a tyre may be subjected to an enormous amount of abuse and can be damaged in many ways. It is imperative that the work of repairing is entrusted only to competent companies that accept total responsibility for the repair work carried out on the tyre, after a careful examination by a specialist to decide whether or not a repair is possible.

## 1 Scope

This British Standard specifies requirements for the repair of diagonal ply and radial ply pneumatic tyres for motorcycles, scooters, cars and commercial vehicles, primarily designed for use on the public highway and first used after 3 January 1933. It specifies inspection procedures, performance criteria, repair material and marking requirements for both tubed and tubeless tyres. Requirements for repairing tubes and inflation valves are also included.

The standard does not apply to:

- a) tyres designed for use on pre-1933 vehicles, as their design and construction may be unique and outside the range of tyres in current use, e.g. tyres used on vintage cars;
- b) temporary use spare tyres;
- c) tyre/wheel assemblies of the limited run-flat type;
- d) temporary repairs;
- e) liquid sealants introduced into tubed or tubeless tyres to remake the air retention property (see clause 9);
- f) tyres for use on agricultural motor vehicles, agricultural trailers or agricultural trailed appliances;
- g) tyres marked by manufacturers as containing sealant gel (often given a trade name).

NOTE 1 Repair information for items c) and g) should be obtained from the tyre manufacturer.

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

**IMPORTANT.** To comply with this standard it is mandatory for repairs to penetration damaged tyres to include a patch to the inside of the tyre and penetration filling material or a combined plug-patch unit.

## 2 Definitions

For the purposes of this British Standard, the following definitions apply.

NOTE Figure 1 to Figure 4 supplement the definitions given in this clause.

### 2.1 Definitions related to structure

#### 2.1.1

##### **diagonal (cross) ply tyre**

pneumatic tyre in which the ply cords extend to the bead and are laid at alternate angles substantially less than 90° to the centreline of the tread

#### 2.1.2

##### **radial ply tyre**

pneumatic tyre in which the ply cords extend to the beads and are laid substantially at 90° to the centreline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt

#### 2.1.3

##### **bias-belted**

pneumatic tyre of the diagonal (cross) ply type in which the carcass is restricted by a belt comprising two or more layers of substantially inextensible cord material laid at alternate angles smaller than those of the carcass

### 2.2 Definitions related to service

#### 2.2.1

##### **ply rating (PR)**

index of tyre strength used to identify a given tyre with its recommended maximum permitted load when used for a specific service as given in BS AU 50-1

NOTE It does not necessarily represent the actual number of plies in a tyre.

#### 2.2.2

##### **service description**

the combination of a tyre's load index or load indices and its speed symbol (see Table 1 and Table 2)

#### 2.2.3

##### **load-capacity index (also referred to as load index or LI)**

a numerical code associated with the maximum load a tyre can carry at the speed indicated by its speed symbol (see Table 1 and Table 2)

#### 2.2.4

##### **speed category (also referred to as speed symbol)**

a symbol indicating the speed at which a tyre can carry the load corresponding to its load index or indices (see Table 1 and Table 2)

### 2.3 Definitions related to main components

#### 2.3.1

##### **bead**

the part of a pneumatic tyre which is of such shape and structure as to fit the rim and hold the tyre on it

**2.3.2****bead heel**

that part of the bead which fills the angle formed by the junction of the rim flange and the bead seat

**2.3.3****bead toe**

innermost part of the bead opposite the heel

**2.3.4****belt** (radial ply tyre)

the layer(s) of material(s) underneath the tread, laid substantially in the direction of the tread centreline, that restricts the carcass in a circumferential direction

**2.3.5****breaker** (diagonal ply tyre)

the intermediate ply between carcass and tread (see also “protective breaker” in **2.3.13**)

**2.3.6****buffing**

mechanical preparation of the tyre surface(s) prior to the application of unvulcanized material

**2.3.7****carcass (casing)**

rubber bonded cord structure of a tyre integral with the beads, which contains the inflation pressure

**2.3.8****chafer**

material in the bead area to protect the carcass against rim chafing

**2.3.9****cord**

textile or non-textile strands (threads) used in various components of the tyre carcass, piles, belts, breakers, etc.

**2.3.10****crown**

area lying between the shoulders of a tyre

**2.3.11****inner-lining**

layer of rubber, from bead toe to bead toe, on the inside of the carcass. In tubeless tyres it has air-retaining properties

**2.3.12****ply**

layer of rubber-coated parallel cords

**2.3.13****protective breaker** (commercial vehicle radial ply tyre)

the optional strip of ply material embodied within the pneumatic tyre between the tread and the belt to minimize damage to the belt

**2.3.14****sidewall**

part of a pneumatic tyre between the tread and the bead

**2.3.15****sidewall rubber**

rubber layer on the sidewall of the tyre and over the carcass, which may include ornamental or protective ribs and fitting lines

**2.3.16****shoulder**

transitional area between the sidewall and the tread

**2.3.17****tread**

part of a pneumatic tyre intended to come in contact with the road

**2.3.18****tubeless tyre**

pneumatic tyre designed for use without an inner tube

**2.4 Definitions relating to repair****2.4.1****patch**

tyre or tube repair unit capable of vulcanization to the inside of a tyre or outside of a tube with the object of sealing a penetration and where necessary providing reinforcement. Types of patch are defined in a), b) and c)

a) rubber only patch. Contains no restricting or reinforcing cords. Used for tube repairs and minor penetration repairs in tyres.

b) combination plug-patch. Shaped moulded unit combining a patch with a stem protruding from the centre of the bonding face. Used for the dual purpose of sealing and filling a penetration in a tyre.

c) reinforced patch. Contains, in addition to rubber, other material often in the form of cords or cables of textile or non-textile material which impart additional strength while maintaining the ability to flex compatibly in normal service when bonded onto the tyre carcass.

**2.4.2****major (reinforced) repair**

a repair which requires a reinforced patch

**2.4.3****minor repair**

a repair which requires one of the following:

- a) a rubber only repair;
- b) a combination plug-patch;
- c) a rubber only patch and penetration filling material.

**2.4.4****rubber**

macromolecular material that has, or can be given, properties of:

- a) returning rapidly at room temperature to the approximate shape from which it has been substantially distorted by a weak stress, and;

- b) not being easily changed to any other permanent shape by the application of heat and moderate pressure.

**2.4.5****vulcanization (cure)**

the transformation of rubber from its plastic to its elastic state:

- a) by the application of heat and physical pressure for a given period of time, or;
- b) at room temperature (minimum 15 °C) over an extended period of time (preferably with pressure).

**2.4.6****temporary repair**

a repair carried out by the vehicle owner or agent intended to allow the vehicle to be driven for a limited period, with care, until a permanent repair can be effected

NOTE It is emphasized that only permanent repairs can comply with the requirements of this standard.

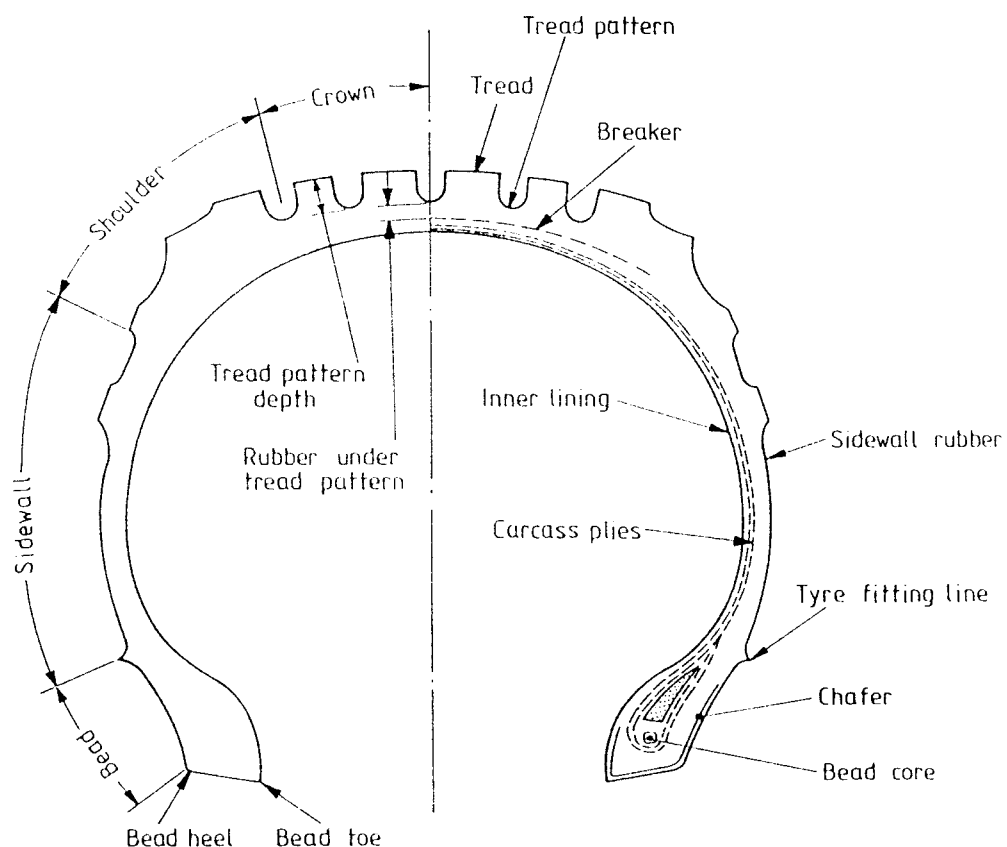


**Figure 1 — Typical section of diagonal ply car tyre (diagrammatic only)**