

Specification for

Repairs to tyres for motor vehicles used on the public highway

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Committees responsible for this British Standard

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- Automobile Association
- British Rubber Manufacturers' Association Ltd.
- Confederation of Passenger Transport
- Consumer Policy Committee of BSI
- Department of Transport
- National Tyre Distributors' Association
- Retread Manufacturers' Association
- Road Haulage Association Ltd.
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- Institute of Road Transport Engineers

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Foreword

This British Standard has been prepared by Technical Committee AUE/3, and specifies procedures for assessing the suitability of a damaged tyre for repair and for carrying out repairs. This revision supersedes BS AU 159e : 1990, which is withdrawn.

As in the 1981 and 1990 editions of this British Standard, it is required in this edition that repaired tyres and tubes are able to operate at their original speed and load capabilities, and 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, plugs externally applied to fitted tyres, or liquid sealants, are not recognized as acceptable repair methods.

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

The 1973 edition of this British Standard allowed for the use of an inner tube to 'repair' very small penetrations in tubeless tyres. This method was not given in the 1981 and 1990 editions or the present edition; instead, it is essential that the tyre itself is repaired in accordance with this British Standard.

Good workshop practice for tyre repair is included in this British Standard, with emphasis on conditions during vulcanizing to ensure that carcasses are cured in the relaxed shape.

In this edition, the concept of major and minor repairs is further clarified over previous editions. A major repair is defined as requiring a reinforced repair patch, and a minor repair requires a rubber only repair. It is required that all major repairs are identified and marked in the vicinity of the repair, giving the repairer's name or identification mark and the number of this British Standard. Marking is not required for minor repairs.

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.

Specification

Introduction

In the course of its life, a tyre may be subjected to an enormous amount of use, and may be damaged in many ways. It is imperative that the work of repairing a tyre is entrusted only to competent companies that accept total responsibility for the repair, after careful specialist examination 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 materials, and marking requirements, for both tubed and tubeless tyres. Requirements for repairing tubes and inflation valves are also included.

This British 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;
- b) T-type temporary use spare tyres;
- c) temporary repairs;
- d) use of liquid sealants introduced into tubed or tubeless tyres to remake the air retention property (see clause 10);
- e) tyres for use on agricultural motor vehicles, agricultural trailers or agricultural trailed appliances;
- f) tyres containing sealant gel (refer to the manufacturer for repair information);
- g) specialist repairs carried out by the original tyre manufacturer.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS AU 50-1 *Tyres and wheels — Part 1: Tyres*

3 Definitions

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

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

3.1 Definitions related to structure

3.1.1 diagonal (cross) ply tyre

Pneumatic tyre in which the ply cords extend to the bead and lie at alternate angles substantially less than 90° to the centreline of the tread.

3.1.2 radial ply tyre

Pneumatic tyre in which the ply cords extend to the bead and lie substantially at 90° to the centreline of the tread, the carcass stabilized by an essentially inextensible circumferential belt.

3.1.3 bias-belted tyre

Pneumatic tyre of the diagonal (cross) ply type, with the carcass restricted by a belt comprising two or more layers of substantially inextensible cord material laid at alternate angles smaller than those of the carcass.

NOTE. For the purposes of this British Standard, a bias-belted tyre may be treated as a diagonal (cross) ply tyre.

3.1.4 temporary use spare tyre

Tyre intended only for temporary use, under restricted driving conditions, and of different type to those fitted for normal driving conditions.

3.1.5 T-type temporary use spare tyre

Temporary use spare tyre designed for use at higher inflation pressures than for standard and reinforced tyres.

3.2 Definitions related to service

3.2.1 ply rating (PR)

Index of tyre strength used to identify a tyre with its recommended maximum permitted load when used for a specific service (see BS AU 50-1).

NOTE. The ply rating does not necessarily represent the number of plies in a tyre.

3.2.2 service description

Combination of a tyre's load index and speed symbol (see tables 1 and 2).

3.2.3 load index

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

3.2.4 speed symbol

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

3.3 Definitions related to main components

3.3.1 bead

Part of a pneumatic tyre shaped and structured to fit and hold the tyre to the rim.

3.3.2 bead heel

Part of the bead that fills the angle formed by the junction of the rim flange and the bead seat.

3.3.3 bead toe

Innermost part of the bead opposite the heel.

3.3.4 belt

Layer(s) of material(s) beneath the tread, laid substantially in the direction of the tread centreline, restricting the carcass in a circumferential direction (radial ply tyres only).

3.3.5 breaker

Intermediate ply between carcass and tread (diagonal ply tyres only).

NOTE. See also 3.3.13.

3.3.6 casing

Worn tyre comprising carcass and remaining tread and sidewall rubber.

3.3.7 carcass

Structural part of a tyre, not including the tread and outermost rubber of the sidewalls, which, when inflated, bears the load on the tyre.

3.3.8 chafer

Material (in the bead area) used to protect the carcass against rim chafing.

3.3.9 cord

Textile or non-textile strands (threads) used in various components of the tyre.

3.3.10 crown

Area between the shoulders of a tyre.

3.3.11 inner-lining

Layer of rubber, from bead toe to bead toe, on the inside of the carcass.

NOTE. In tubeless tyres the inner-lining has air-retaining properties.

3.3.12 ply

Layer of rubber-coated parallel cords.

3.3.13 protective breaker

Optional strip of ply material between the tread and the belt, used to minimize damage to the belt (commercial vehicle radial ply tyres only).

3.3.14 sidewall

Part of a pneumatic tyre between the tread and the bead.

3.3.15 sidewall rubber

Rubber layer on the sidewall of the tyre and outside of the carcass, which may include ornamental or protective ribs and fitting lines.

3.3.16 shoulder

Area between the sidewall and tread.

3.3.17 shoulder ply

Optional bracing strip of ply material laid at an angle to the carcass cords under the edge of the belt.

3.3.18 tread

Part of the pneumatic tyre intended to contact the road.

3.3.19 tubeless tyre

Pneumatic tyre designed for use without an inner tube.

3.4 Definitions relating to repair

3.4.1 patch

Tyre or tube repair unit able to vulcanize to the inside of a tyre or outside of a tube, with the object of sealing a penetration, and, if necessary, providing reinforcement (see 3.4.2 to 3.4.6).

3.4.2 rubber only patch

Patch containing no restricting or reinforcing cords, used for tube repairs and minor penetration repairs in tyres.

3.4.3 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.

3.4.4 reinforced patch

Patch containing material, in addition to rubber, often in the form of cords or cables of textile or non-textile material, that impart additional strength while maintaining ability to flex compatibly in normal service when bonded onto a tyre carcass.

3.4.5 reinforced cross ply patch

Type of reinforced patch in which the cords are oriented to align approximately with the ply cords in a cross ply tyre.

3.4.6 reinforced radial ply patch

Type of reinforced patch in which the cords are oriented to align approximately with the ply cords in a radial ply tyre.

3.4.7 major (reinforced) repair

Repair requiring a reinforced patch.

NOTE. Major repairs are fully defined in annexes C, D, F and G.

3.4.8 minor repair

Repair requiring one of the following:

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

NOTE. Minor repairs are fully defined in annexes B, E and H.

3.4.9 rubber

Macromolecular material with the following properties:

- a) rapid return to the original shape, at room temperature, after substantial distortion under weak stress; and
- b) resistance to permanent deformation by heat and moderate pressure.

3.4.10 vulcanization (curing)

Transformation of rubber from the plastic to elastic state, by:

- a) heat and pressure for a given period; or
- b) natural process at room temperature (minimum 15 °C) over an extended period (preferably with pressure).

Table 1. Load–capacity index (LI)

LI	Load kg	LI	Load kg	LI	Load kg	LI	Load kg	LI	Load kg	LI	Load kg	LI	Load kg
0	45	40	140	80	450	120	1400	160	4500	200	14000	240	45000
1	46.2	41	145	81	462	121	1450	161	4625	201	14500	241	46250
2	47.5	42	150	82	475	122	1500	162	4750	202	15000	242	47500
3	48.7	43	155	83	487	123	1550	163	4875	203	15500	243	48750
4	50	44	160	84	500	124	1600	164	5000	204	16000	244	50000
5	51.5	45	165	85	515	125	1650	165	5150	205	16500	245	51500
6	53	46	170	86	530	126	1700	166	5300	206	17000	246	53000
7	54.5	47	175	87	545	127	1750	167	5450	207	17500	247	54500
8	56	48	180	88	560	128	1800	168	5600	208	18000	248	56000
9	58	49	185	89	580	129	1850	169	5800	209	18500	249	58000
10	60	50	190	90	600	130	1900	170	6000	210	19000	250	60000
11	61.5	51	195	91	615	131	1950	171	6150	211	19500	251	61500
12	63	52	200	92	630	132	2000	172	6300	212	20000	252	63000
13	65	53	206	93	650	133	2060	173	6500	213	20600	253	65000
14	67	54	212	94	670	134	2120	174	6700	214	21200	254	67000
15	69	55	218	95	690	135	2180	175	6900	215	21800	255	69000
16	71	56	224	96	710	136	2240	176	7100	216	22400	256	71000
17	73	57	230	97	730	137	2300	177	7300	217	23000	257	73000
18	75	58	236	98	750	138	2360	178	7500	218	23600	258	75000
19	77.5	59	243	99	775	139	2430	179	7750	219	24300	259	77500
20	80	60	250	100	800	140	2500	180	8000	220	25000	260	80000
21	82.5	61	257	101	825	141	2575	181	8250	221	25750	261	82500
22	85	62	265	102	850	142	2650	182	8500	222	26500	262	85000
23	87.5	63	272	103	875	143	2725	183	8750	223	27250	263	87500
24	90	64	280	104	900	144	2800	184	9000	224	28000	264	90000
25	92.5	65	290	105	925	145	2900	185	9250	225	29000	265	92500
26	95	66	300	106	950	146	3000	186	9500	226	30000	266	95000
27	97.5	67	307	107	975	147	3075	187	9750	227	30750	267	97500
28	100	68	315	108	1000	148	3150	188	10000	228	31500	268	100000
29	103	69	325	109	1030	149	3250	189	10300	229	32500	269	103000
30	106	70	335	110	1060	150	3350	190	10600	230	33500	270	106000
31	109	71	345	111	1090	151	3450	191	10900	231	34500	271	109000
32	112	72	355	112	1120	152	3550	192	11200	232	35500	272	112000
33	115	73	365	113	1150	153	3650	193	11500	233	36500	273	115000
34	118	74	375	114	1180	154	3750	194	11800	234	37500	274	118000
35	121	75	387	115	1215	155	3875	195	12150	235	38750	275	121000
36	125	76	400	116	1250	156	4000	196	12500	236	40000	276	125000
37	128	77	412	117	1285	157	4125	197	12850	237	41250	277	128500
38	132	78	425	118	1320	158	4250	198	13200	238	42500	278	132000
39	136	79	437	119	1360	159	4375	199	13600	239	43750	279	136000