



2SP 83 to 85 : October : 1973

(Superseding British Standard SP 83-85)

UDC 629.7.02 : 621.884.2 : 669.715

British Standard : Aerospace Series

Specification for

Mushroom head aluminium alloy rivets*

Foreword

These standards form part of a series of British Standards for rivets prepared at the request of the aerospace industry.

In general, in the 1958 edition, the dimensions of the rivets were more closely defined than previously, although the shank tolerances on sizes above $\frac{1}{8}$ in are wider than those adopted in British Standards SP 68 to SP 71, '100° countersunk precision head aluminium and aluminium alloy rivets'.

The distribution of the shank tolerances follows the American practice of allocating the greater part of the tolerance to the positive side, as compared with the practice in A.S. Standards for rivets of distributing the tolerances about the nominal diameter. This principle, as well as the proportions of the rivet heads, has been endorsed by Technical Committee ISO/TC 20—Aircraft and Space Vehicles, as have the identification markings contained in this revision of the standards. A method for the identification of undyed versions of the rivets is given.

Details of rivets with radiused tails for use in auto-riveting machines are given in Appendix A.

1. Scope

These British Standards specify the material, dimensions, finish, marking and part numbers of mushroom head aluminium alloy rivets for aerospace use.

NOTE. The figures in inch units are to be regarded as the standard. A table is given in Appendix B to provide a ready means of calculating the approximate metric equivalents of the imperial dimensions. More accurate conversions should be based on the tables in BS 350.

2. Material

The rivets shall be manufactured from the appropriate material specified in Table 1 in the condition as supplied.

3. Condition of rivets

3.1 Rivets to British Standard SP 83 require heat treatment in accordance with 8.1 and 8.2 before use.

3.2 Rivets to British Standard SP 84 require no heat treatment.

3.3 Rivets to British Standard SP 85 shall be finally heat treated by the rivet manufacturer in accordance with 8.3.

4. Dimensions

The rivets shall conform to the dimensions specified in Tables 2 and 3.

*Index form of title: Rivets, mushroom head, in L37, L58 and L86 materials.

Gr 3

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2SP 83 to 2SP 85 : 1973

5. Finish

5.1 The finish of the rivets shall be in accordance with the relevant requirements of Table 1.

5.2 Anodic treatment shall be in accordance with the requirements of the latest issue of Procurement Executive M.O.D. aircraft process specification DEF 151.

5.3 Chemical oxidation shall be in accordance with the requirements of the latest issue of Procurement Executive M.O.D., aircraft process specification DTD 913.

5.4 Colouring shall be in accordance with the requirements of the latest issue of Procurement Executive, M.O.D., process specification DTD 913, or other approved process, e.g. DEF 151.

6. Identification and marking

6.1 The markings of the rivets shall be as specified in Table 1, and shall be applied as follows.

(1) Rivets over $\frac{3}{32}$ in diameter which do not exceed 8 diameters in length shall be marked on the shank end.

(2) Rivets $\frac{1}{16}$ in and $\frac{3}{32}$ in diameter in all lengths, and rivets over $\frac{3}{32}$ in diameter which exceed 8 diameters in length may be marked on either the head or the shank end.

The marking, whether indented or embossed, shall be clearly visible, and the height or depth shall not exceed the following dimensions:

0.006 in on sizes up to and including $\frac{1}{16}$ in diameter;

0.008 in on sizes $\frac{3}{32}$ in and $\frac{1}{8}$ in diameter;

0.010 in on sizes $\frac{5}{32}$ in diameter and over.

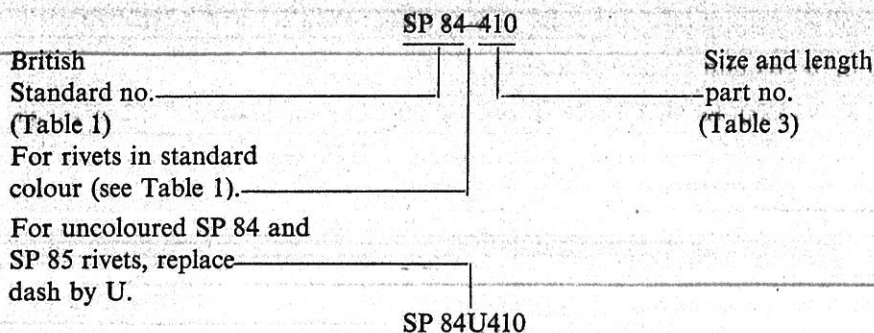
6.2 Rivets identified by the old-style markings may be supplied until existing stocks are consumed or until the end of 1976, whichever is the sooner. The obsolescent markings are as follows.

Material	Marking
L 37	7
L 58	8
L 86	0

6.3 The rivets shall be identified for ordering purposes by the relevant British Standard number (see Table 1) and the appropriate part number (see Table 3), e.g. a rivet in L 58 material $\frac{1}{8}$ in diameter \times $\frac{1}{2}$ in length is SP 84-410.

6.4 Undyed versions of rivets shall be identified by their part number with the letter 'U' in place of the dash.

6.5 Example of call-up:



7. Freedom from defects

The rivets shall be free from harmful defects.

Rivets may be rejected at any time for faults in, or revealed by manufacture, although they have been made from material passed previously for chemical composition and mechanical properties.

8. Heat treatment of rivets

8.1 Immediately before use or before refrigeration as described in **8.2** rivets to British Standard SP 83 shall be heated uniformly at a temperature of $495 \pm 5^\circ\text{C}$ and quenched in water at a temperature not exceeding 40°C .

8.2 Rivets to British Standard SP 83 commence to age harden immediately when kept at atmospheric temperature after quenching. Ageing may be delayed, however, by storing the rivets at low temperatures after quenching, and they may be expected to remain in a condition suitable for closing for a period depending on the storage temperature as shown below.

Temperature	Maximum storage period
0°C to -5°C	45 hours
-15°C to -20°C	150 hours

The rivets shall be closed within two hours of solution treatment if kept at atmospheric temperature or within two hours of removal from cold storage.

8.3 Rivets to British Standard SP 85 shall be heat treated by the rivet manufacturer as follows.

Solution treat at a temperature of $495 \pm 5^\circ\text{C}$ and quench in water at a temperature not exceeding 40°C . Age at room temperature for not less than four days.

9. Packaging

Rivets shall be packaged, bagged or labelled, and such packages, bags or labels shall bear the appropriate complete part number, e.g. SP 84-410. See Table 3 for part numbers.

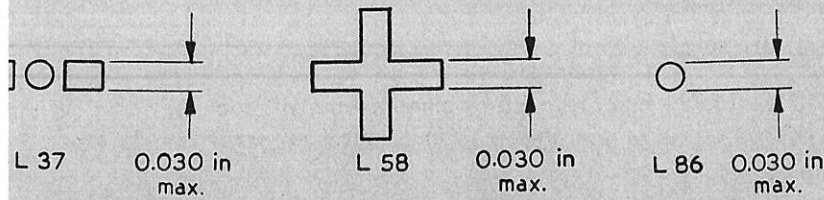
Table 1. British Standard numbers, materials, finish and marking of mushroom head aluminium alloy rivets

British Standard no.	Material	Finish		Identification mark (see 6.1)
	British Standard	Treatment	Colour	
SP 83	L 37*	None	Plain	— o — Embossed
SP 84	L 58*	Anodic or chemical oxidation	Green	+ Embossed
SP 85	L 86*		Violet	o Indented

* Latest issue.

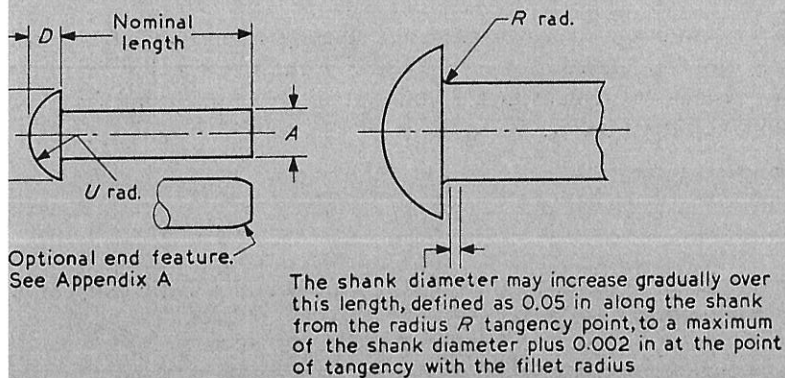
NOTE. Undyed versions of rivets in L 58 and L 86 are also available. See 6.4.

SP 83 to 2SP 85 : 1973



1. Dimensions of identification marks

Table 2. Dimensions of mushroom head aluminium alloy rivets



2. Rivet dimensions Fig. 2. Enlarged view of head

Final standard proportions:

- 2 × nominal size of rivet.
- 0.4 × nominal size of rivet.
- 1.45 × nominal size of rivet.

standard lengths see Table 3.

Nominal size of rivet	Diameter of shank, <i>A</i>		Diameter of head, <i>B</i>		Depth of head, <i>D</i>		Radius of head, <i>U</i> (Reference only)	Radius under rivet head, <i>R</i> max.
	max.	min.	max.	min.	max.	min.		
	in	in	in	in	in	in	in	in
(0.062)	0.065	0.061	0.130	0.117	0.027	0.023	0.090	0.010
(0.094)	0.097	0.093	0.197	0.178	0.041	0.035	0.136	0.010
(0.125)	0.128	0.124	0.263	0.237	0.054	0.046	0.181	0.010
(0.156)	0.160	0.155	0.325	0.299	0.066	0.058	0.226	0.010
(0.187)	0.191	0.186	0.389	0.359	0.080	0.070	0.271	0.015
(0.219)	0.223	0.218	0.453	0.423	0.093	0.083	0.317	0.015
(0.250)	0.254	0.249	0.517	0.483	0.106	0.094	0.363	0.015
(0.312)	0.316	0.311	0.645	0.603	0.132	0.118	0.452	0.020
(0.375)	0.379	0.374	0.773	0.727	0.158	0.142	0.543	0.020

2SP 83 to 2SP 85 : 1973

Table 3. Standard lengths and part numbers of mushroom head aluminium alloy rivets

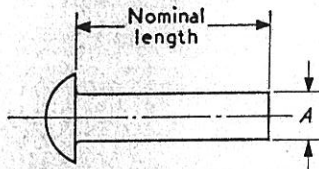


Fig. 3. Mushroom head rivet

Nominal length, L^*	Nominal diameter, A , in inches								
	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{32}$	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$
	Part number The last two figures of the part numbers denote the length in $\frac{1}{16}$ in, the remaining figure or figures denoting the diameter in $\frac{1}{32}$ in.								
in									
$\frac{1}{8}$	202	302							
$\frac{3}{16}$	203	303	403						
$\frac{1}{4}$	204	304	404	504					
$\frac{5}{16}$	205	305	405	505	605				
$\frac{3}{8}$	206	306	406	506	606	706	806		
$\frac{7}{16}$	207	307	407	507	607	707	807	1007	
$\frac{1}{2}$	208	308	408	508	608	708	808	1008	1208
$\frac{9}{16}$	209	309	409	509	609	709	809	1009	1209
$\frac{5}{8}$	210	310	410	510	610	710	810	1010	1210
$\dagger\frac{11}{16}$	\dagger 211	\dagger 311	\dagger 411	\dagger 511	\dagger 611	\dagger 711	\dagger 811	\dagger 1011	\dagger 1211
$\frac{3}{4}$	\dagger 212	312	412	512	612	712	812	1012	1212
$\dagger\frac{13}{16}$	\dagger 213	\dagger 313	\dagger 413	\dagger 513	\dagger 613	\dagger 713	\dagger 813	\dagger 1013	\dagger 1213
$\frac{7}{8}$	\dagger 214	314	414	514	614	714	814	1014	1214
$\dagger\frac{15}{16}$	\dagger 215	\dagger 315	\dagger 415	\dagger 515	\dagger 615	\dagger 715	\dagger 815	\dagger 1015	\dagger 1215
1	\dagger 216	316	416	516	616	716	816	1016	1216
1 $\frac{1}{8}$		\dagger 318	418	518	618	718	818	1018	1218
1 $\frac{1}{4}$		\dagger 320	420	520	620	720	820	1020	1220
1 $\frac{3}{8}$		\dagger 322	422	522	622	722	822	1022	1222
1 $\frac{1}{2}$		\dagger 324	424	524	624	724	824	1024	1224
1 $\frac{3}{4}$			428	528	628	728	828	1028	1228
2				532	632	732	832	1032	1232
2 $\frac{1}{2}$					640	740	840	1040	1240
3					648	748	848	1048	1248

* ± 0.010 in for rivets of diameter up to and including $\frac{9}{16}$ in; ± 0.015 in for rivets of diameter $\frac{3}{8}$ in and larger.

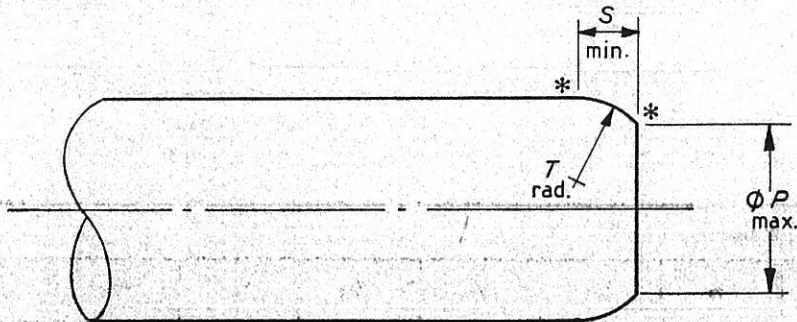
\dagger Non-preferred sizes.

NOTE. For details of rivets with radiused tails see Appendix A. The maximum available lengths of radiused tail rivets are indicated in Table 3 by the broken line in each nominal diameter column. The maximum nominal length L available for each nominal diameter A is the length corresponding to the part number appearing immediately above the broken line.

2SP 83 to 2SP 85 : 1973

Appendix A Rivets for use in auto-riveting machines

A.1 With the advent of auto-riveting machines, it is necessary to form the rivet tail with a small radius. Conventional methods of riveting are unaffected by this feature.



*Intersection points

Fig. 4. Detail of radiused tail

Table 4. Dimensions of radiused tails

Nominal diameter	S min.	T rad. ±0.010 in.	Dia. P max.
in	in	in	in
1/16	0.011	0.019	0.053
3/32	0.018	0.029	0.078
1/8	0.026	0.039	0.102
5/32	0.034	0.049	0.128
3/16	0.042	0.059	0.153
7/32	0.049	0.069	0.180
1/4	0.057	0.078	0.202
5/16	0.073	0.098	0.248
3/8	0.089	0.117	0.294

A.2 After 1976, rivets of standard lengths and diameters, up to the maximum available lengths indicated by broken lines, as shown in Table 3, will only be supplied with radiused tails. Until then, manufacturers are free to supply rivets with either tail form, unless purchasers specifically order rivets with radiused tails.

A.3 Rivets with lengths and diameters outside the range detailed in A.2 will, normally, only be supplied in the blunt-ended configuration.

Appendix B

Conversion of inches to approximate millimetre equivalents

in	mm	in	mm	in	mm
$\frac{1}{32}$	0.8	$\frac{7}{16}$	11.1	1	25.4
$\frac{1}{16}$	1.6	$\frac{1}{2}$	12.7	2	50.8
$\frac{3}{32}$	2.4	$\frac{9}{16}$	14.3	3	76.2
$\frac{1}{8}$	3.2	$\frac{5}{8}$	15.9	4	101.6
$\frac{5}{32}$	4.0	$1\frac{1}{16}$	17.5	5	127.0
$\frac{3}{16}$	4.8	$\frac{3}{4}$	19.1	6	152.4
$\frac{7}{32}$	5.6	$1\frac{3}{16}$	20.7	7	177.8
$\frac{1}{4}$	6.4	$\frac{7}{8}$	22.2	8	203.2
$\frac{5}{16}$	8.0	$1\frac{5}{16}$	23.9	9	228.6
$\frac{3}{8}$	9.6			10	254.0

Examples:

$$1\frac{1}{8} \text{ in} = 25.4 + 9.6 = 35.0 \text{ mm}$$

$$0.124 \text{ in} = 2.54 + 0.508 + 0.1016 = 3.15 \text{ mm}$$

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Attention is drawn to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

Revision of British Standards

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. **It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.**

The following BSI references relate to the work on this standard:

Committee reference ACE/14 Draft for approval 72/35867

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AMD 3266

BSI

Amendment Slip No. 2
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to British Standard 2SP 83 to 85 : 1973
(Aerospace Series)
Mushroom head aluminium alloy rivets



Revised text

AMD 3266
June 1980

Clause 6.2 (as amended by Amendment No. 1)

In the first sentence insert a full stop after 'consumed' and delete 'or until the end of 1978, whichever is the sooner.'

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