BRITISH STANDARD AEROSPACE SERIES

BS 2SP 77 to 2SP 80:1973 +A4:2015

Specification for

Snap head aluminium and aluminium alloy rivets*

ICS 49.030.60

***Index form of title:** Rivets, snap head, in L36, L37, L58 and L86 materials.

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Foreword

Publishing information

BS 2SP 77 to BS 2SP 80:1973+A4:2015 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 January 2015. It was prepared by Technical Committee ACE/12, *Aerospace Fasteners and Fastening*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

BS 2SP 77 to BS 2SP 80:1973+A4:2015 supersedes BS 2SP 77 to BS 2SP 80:1973 (incorporating Amendments No.1, No. 2 and No. 3) which is withdrawn.

Information about this document

These standards form part of a series of British Standards for rivets prepared at the request of the aerospace industry. The 1958 edition provided for ranges of snap head aluminium and aluminium alloy rivets with head proportions and shank diameters basically the same as those used hitherto. In general, the dimensions of the rivets were more closely defined than previously, although the shank tolerances on sizes above ½ in are wider than those adopted in BS SP 68 to BS 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, of the International Organization for Standardization, as have the identification markings contained in this revision of the standards. A method for the identification of undyed versions of the rivets is also given.

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

Text introduced or altered by Amendment No. 4 is indicated in the text by tags A4〉 〈A4. Minor editorial changes are not tagged. Previous amendments are not indicated.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

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

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.

This British Standard, having been approved by the Aerospace Industry Standards Committee, was published under the authority of the Executive Board on 31 October 1973

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 5 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.

Amendments issued since publication

Amd. No.	Date	Comments
1884	January 1976	
2389	November 1977	
3264	June 1980	
A4	January 2015	See Foreword

The following BSI references relate to the work on this standard:
Committee reference ACE/14
Drafts for approval 72/35865
DC 13/30273392

ISBN 978 0 580 81038 1

Contents

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1 Scope

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

NOTE The figures in inch units are to be regarded as the standard. [A4] Accurate metric conversions should be based on the tables in BS 350. [A4]

2 Materials

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 BS SP 77 require no heat treatment.

3.2 Rivets to BS SP 78 require heat treatment in accordance with **8.1** and **8.2** before use.

3.3 Rivets to BS SP 79 require no heat treatment.

3.4 Rivets to BS SP 80 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 Table 2 and Table 3.

5 [A4] Protective finish [A4]

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

Anodic treatment shall be in accordance with the requirements of the latest issue of [A4] MoD Defence Equipment and Support Standard Def Stan 03-25 [A4].

Chemical oxidation shall be in accordance with the requirements of the latest issue of [A4] MoD Defence Equipment and Support Standard [A4] DTD 913.

Colouring shall be in accordance with the requirements of the latest issue of [A4] MoD Defence Equipment and Support Standard [A4] DTD 913, or other approved process, e.g., [A4] Def Stan 03-25 [A4].

6 Identification and marking

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

1) Rivets over $^{3}/_{32}$ in diameter which do not exceed 8 diameters in length shall be marked on the shank end with the exception of the $^{1}/_{8}$ in diameter which may be marked on the head.

2) Rivets $^{1}/_{16}$ in and $^{3}/_{32}$ in diameter in all lengths, and rivets over $^{3}/_{32}$ 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 $^{1}/_{8}$ in diameter;

0.008 in on sizes $^{5}/_{32}$ in and $^{3}/_{16}$ in diameter;

0.010 in on sizes $^{7}/_{32}$ in diameter and over.

6.2 Rivets identified by old-style markings may be supplied until existing stocks are consumed. The obsolescent markings are as follows:

Material	Marking
L 36	"1"
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 $^{1}/_{8}$ in diameter × $^{5}/_{6}$ in length is [A4] SP79-410 [A4].

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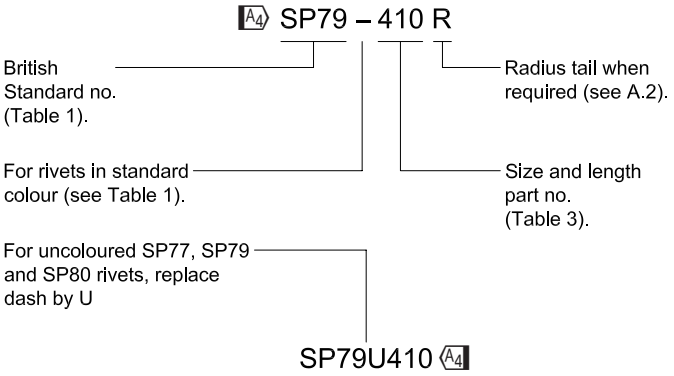
6.4 Undyed versions of rivets shall be identified by their part number with the letter "U" in place of the dash.

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 BS SP 78 shall be heated uniformly at a temperature of 495 ± 5 °C and quenched in water at a temperature not exceeding 40 °C.

8.2 Rivets to BS SP 78 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 BS SP 80 shall be heat treated by the rivet manufacturer as follows.

Solution treat at a temperature of 495 ± 5 °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 packaging, bags and labels shall bear the appropriate complete part number, e.g. SP79-410. See Table 3 for part numbers.

Table 1 — British Standard numbers, materials, finish and marking of snap head aluminium and aluminium alloy rivets

British Standard no.	**Material**		**Finish**		**Identification mark (see 6.1)**
	Description	**British Standard**	**Treatment**	**Colour**	
BS SP 77	Aluminium	[a]L 36	Anodic or chemical oxidation	Black	"I"
BS SP 78	Aluminium alloy	[a]L 37	None	Plain	— o — Embossed
BS SP 79		[a]L 58	Anodic or chemical oxidation	Green	+ Embossed
BS SP 80		[a]L 86		Violet	o Indented
[a] Latest issue.					

NOTE Undyed versions of rivets in L 36, L 58 and L 86 are also available. See **6.4**.

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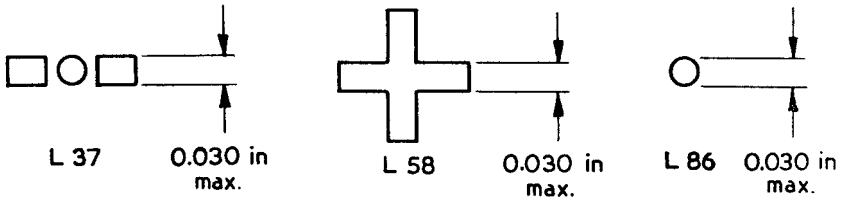

Figure 1 — Dimensions of identification marks

Table 2 — Dimensions of snap head aluminium and aluminium alloy rivets

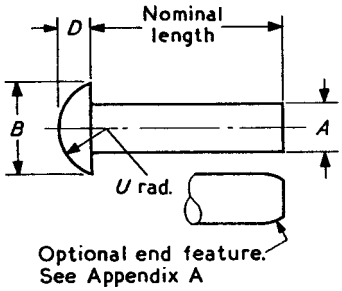

Figure 2 — Rivet dimensions

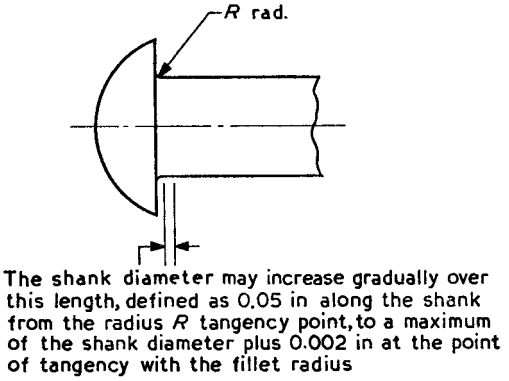

Figure 2a — Enlarged view of head

Nominal standard proportions:

B = 1.75 × nominal size of rivet.

D = 0.6 × nominal size of rivet.

U = 0.94 × nominal size of rivet.

For standard lengths see Table 3.

Nominal size of rivet	Diameter of shank, *A*		Diameter of head, *B*		Depth of head, *D*		Radius of head, *U* (Reference only)	Radius under rivet head, *R* max.
	max.	min.	max.	min.	max.	min.		
in	in	in	in	in	in	in	in	in
1/16 (0.062)	0.065	0.061	0.114	0.103	0.039	0.035	0.058	0.010
3/32 (0.094)	0.097	0.093	0.170	0.157	0.059	0.053	0.088	0.010
1/8 (0.125)	0.128	0.124	0.227	0.210	0.079	0.071	0.117	0.010
5/32 (0.156)	0.160	0.155	0.282	0.263	0.098	0.090	0.146	0.010
3/16 (0.187)	0.191	0.186	0.338	0.317	0.117	0.107	0.175	0.015
7/32 (0.219)	0.223	0.218	0.394	0.371	0.136	0.126	0.206	0.015
1/4 (0.250)	0.254	0.249	0.450	0.425	0.156	0.144	0.234	0.015
5/16 (0.312)	0.316	0.311	0.562	0.531	0.194	0.180	0.292	0.020
3/8 (0.375)	0.379	0.374	0.673	0.638	0.233	0.217	0.352	0.020

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Table 3 — Standard lengths and part numbers of snap head aluminium and aluminium alloy rivets

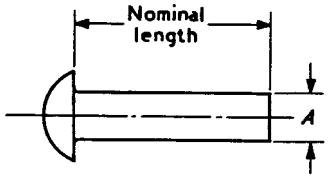

Figure 3 — Snap head rivet

Nominal length, L[a]	Nominal diameter, A, in inches								
	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8
	Part number **The last two figures of the part numbers denote the length in 1/16 in, the remaining figure or figures denoting the diameter in 1/32 in.**								
in									
1/8	202	302							
3/16	203	303	403						
1/4	204	304	404	504	604				
5/16	205	305	405	505	605				
3/8	206	306	406	506	606	706	806		
7/16	207	307	407	507	607	707	807	1 007	
1/2	208	308	408	508	608	708	808	1 008	1 208
9/16	209	309	409	509	609	709	809	1 009	1 209
5/8	210	310	410	510	610	710	810	1 010	1 210
b11/16	b211	b311	b411	b511	b611	b711	b811	b1 011	b1 211
3/4	b212	312	412	512	612	712	812	1 012	1 212
b13/16	b213	b313	b413	b513	b613	b713	b813	b1 013	b1 213
7/8	b214	314	414	514	614	714	814	1 014	1 214
b16/16	b215	b315	b415	b515	b615	b715	b815	b1 015	b1 215
1	b216	316	416	516	616	716	816	1 016	1 216
1 1/8		b318	418	518	618	718	818	1 018	1 218
1 1/4		b320	420	520	620	720	820	1 020	1 220
1 3/8		b322	422	522	622	722	822	1 022	1 222
1 1/2		b324	424	524	624	724	824	1 024	1 224
1 3/4			428	528	628	728	828	1 028	1 228
2				532	632	732	832	1 032	1 232
2 1/2					640	740	840	1 040	1 240
3					648	748	848	1 048	1 248

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.

[a] ± 0.010 in for rivets of diameter up to and including 3/16 in; ± 0.015 in for rivets of diameter 7/32 in and larger.

[b] Non-preferred sizes.

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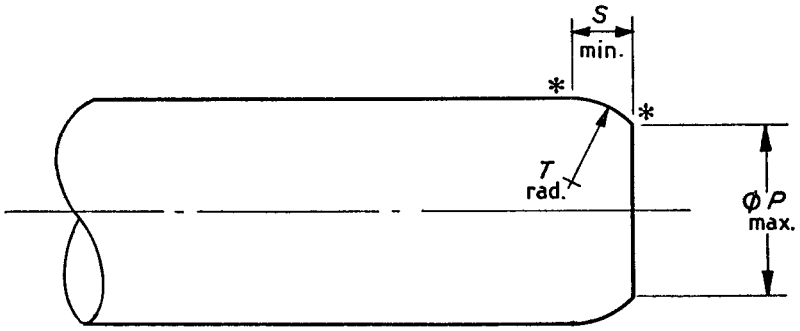
Appendix A Rivets for use in auto-riveting machines

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.

Figure 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 Rivets of standard lengths and diameters, up to the maximum available lengths indicated by the broken lines shown in Table 3, may be supplied with radius tails on request. The method of call-up is given in **6.5**.

[A4] *Text deleted.* [A4]

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