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BRITISH STANDARD : AEROSPACE SERIES
SPECIFICATION FOR
100° COUNTERSUNK HEAD STEEL BOLTS
(160 000 lbf/in² (110 hbar) WITH TORQ-SET
RECESSES*)

FOREWORD

This British Standard has been prepared to provide a range of 160 000 lbf/in² (110 hbar) 180 000 lbf/in² (125 hbar) steel forged bolts, with UNJ profile threads and close tolerance 100° countersunk heads and shanks for aircraft use. The lengths of the bolts are in fractional increments.

The heads have a Torq-set recess and the bolts are similar in all respects except recess to those bolts given in BS A 230 (Hi-torque recess).

As in British Standard A 173 the 'flushness tolerance' method is adopted for the dimensioning of the countersunk head. The basic principles and advantages of this method are outlined in Appendix A to this Standard, together with suggested methods of gauging. Details of the method of gauging the screwdriver recesses are given in Appendix B. Screwdriver point dimensions are given in Appendix C.

This standard requires reference to the following British Standards:

BS 4084. Unified screw threads of 'UNJ' basic profile.

BS A 100. General requirements for bolts and nuts of tensile strength not exceeding 180 000 lbf/in² (125 hbar).

BS S 103. Low nickel-chromium steel (wire only for the manufacture of forged bolts).

†BS S... (101) Low nickel-chromium steel.

NOTE. The values in British units are to be regarded as the standard. A table in Appendix D provides millimetre equivalents of inch dimensions based on the tables in BS 350, 'Conversion factors and tables'.

* Attention is called to the fact that the Torq-set recess is the subject of British and foreign patents.

† In course of preparation.

SPECIFICATION

1. SCOPE

This British Standard specifies the materials, dimensions, finish and inspection requirements for cadmium plated steel bolts with countersunk heads and Unified threads for aircraft use.

2. GENERAL REQUIREMENTS

The bolts shall be manufactured, inspected and tested in accordance with the requirements of British Standard A 100.

3. MATERIAL AND MANUFACTURE

3.1 The bolts shall be forged from material which complies with the latest issue of one of the following British Standards:

S 103
or
S ... (101)*

3.2 In the finally heat-treated condition, the mechanical properties of the material used for forged bolts shall be as follows:

0.2% proof stress	not less than 140 000 lbf/in ² (96.5 hbr)
Tensile strength	not less than 160 000 lbf/in ² (110 hbar)
Elongation on $5.65\sqrt{S_0}$	not less than 10%

4. DIMENSIONS

4.1 All bolts shall conform to the dimensions and tolerances given in Tables 1 and 2.

* In course of preparation.

4.2 The run-out of the thread shall comply with the relevant requirements of British Standard A 100.

4.3 The nominal length of the bolt shall be the bearing length L .

5. SCREW THREADS

The screw threads shall conform to the basic thread form, diameter and related pitches specified in BS 4084, 'Unified screw threads of 'UNJ' basic profile' (Class 3A).

6. ANTI-CORROSION TREATMENT

All bolts shall be coated with cadmium, in accordance with the relevant requirements of British Standard A 100.

7. IDENTIFICATION AND MARKING

The bolts shall be marked on the top face of the head with the number of this British Standard and the relevant part numbers shown in Table 2, e.g. A 232/E6.

8. GAUGING

8.1 The method of head dimensioning shown in Table 1 defines maximum and minimum head envelopes which control flushness in the manner described in Appendix A.

8.2 The type of gauge shown in Figs. 4 and 5 is recommended as being suitable for flushness measurement, but the type of gauge to be used is not a mandatory requirement of this standard. The gauge shown in Figs. 4 and 5 does not control the head angle, which will require to be checked at intervals during production. An additional gauge will be necessary for the absolute minimum head diameter.

8.3 The penetration of the recess shall be gauged in accordance with Appendix B.

Amendment Slip No.2, published 7 February, 1973

to British Standard A.232:1968

(Aerospace Series)

100° Countersunk steel bolts (160,000 lbf/in² (110 hbar)
with Torq-set recesses*)

Revised text

Foreword. Insert the word 'to' in first line, between '(110 hbar)' and '180 000 lbf/in²'.

New Clause. Insert the following new clause:

'4.4. Oversizes for bolts are designated X and Y for the first and second oversize respectively. Dimensions for oversize bolts are given in Appendix E.'

Clause 7. In the last line of this clause delete ', e.g. A 232/E6.' and substitute the following:

'and Appendix E.

e.g. Standard size A232E6
First oversize A232E6X
Second oversize A232E6Y

New Appendix. Add the following new Appendix:

'APPENDIX E
OVERSIZE BOLTS

Nominal size UNJF	Decimal Equivalent	A (Plain shank dia.)		First oversize (X)		Second oversize (Y)	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
10 — 32	0·1900	0·1895	0·1885	0·2051	0·2041	0·2208	0·2198
$\frac{1}{4}$	0·2500	0·2495	0·2485	0·2651	0·2641	0·2808	0·2798
$\frac{5}{16}$	0·3125	0·3120	0·3110	0·3276	0·3266	0·3433	0·3423
$\frac{3}{8}$	0·3750	0·3745	0·3735	0·3901	0·3891	0·4058	0·4048
$\frac{7}{16}$	0·4375	0·4370	0·4360	0·4526	0·4516	0·4683	0·4673
$\frac{1}{2}$	0·5000	0·4995	0·4985	0·5151	0·5141	0·5308	0·5298

Examples of part numbers for identification of bolts:

Standard size A232E6

First oversize A232E6X

Second oversize E232E6Y.'

Gr 0

Amendment Slip No.3, published 29 October 1976
to British Standard A.232 : 1968
(Aerospace Series)

100° countersunk head steel bolts
(160,000 lbf/in² (110 hbar)
with Torq-set recesses)

Revised text

Foreword. In the list of reference standards delete 'S 103 Low nickel-chromium steel (wire only for the manufacture of forged bolts)' and '+S ... Nickel-chromium-molybdenum steel'.

At the end of the list insert the following:

- 'S 147 Nickel-chromium-molybdenum steel (bar for the manufacture of forged bolts only)
- 148 Low nickel-chromium steel (bar for the manufacture of forged bolts only)
- S 149 1.75 per cent nickel-chromium-molybdenum steel
- S ...† 1 % chromium-molybdenum steel bars for the manufacture of forged bolts and forged nuts'

Clause 3.1 Delete 'S 103 or *S ...' and substitute the following:

'S 147
or S 148
or S 149
or S ...*'

Amendment Slip No.4
published and effective from 30 April 1979
to BS A.232 : 1968
(Aerospace Series)

100° countersunk head steel bolts
(160 000 lbf/in² (110 hbar)
with Torq-set recesses)

Revised text

Appendix E. Oversize bolts (as inserted by Amendment No.2). In the table, against nominal size 10–32, under the column headed ‘First oversize (X)’ delete the maximum value ‘0.2051’ and the minimum value ‘0.2041’ and substitute the values ‘0.2026’ and ‘0.2016’ respectively. Also, under the column headed ‘Second oversize (Y)’ delete the maximum value ‘0.2208’ and the minimum value ‘0.2198’ and substitute the values ‘0.2182’ and ‘0.2172’ respectively.

