

F) D 703-1940

[3 B. 11. April, 1933.]

(Cancelling B.S. Specification 2 B. 11.)

NOTE.—The Institution desires to call attention to the fact that this Specification is intended to include the technical provisions necessary for the supply of the material herein referred to, but does not purport to comprise all the necessary provisions of a contract.

British Standards Institution.

Incorporated by Royal Charter.

FORMED IN 1901 AS THE ENGINEERING STANDARDS COMMITTEE.
INCORPORATED IN 1918 AS THE BRITISH ENGINEERING STANDARDS ASSOCIATION.

British Standard Specification for Aircraft Material.

**BRASS BARS SUITABLE TO BE BRAZED
OR SILVER SOLDERED.**

1. **Chemical Composition.** (a) The chemical composition of the bars shall be:—

Copper	-	-	-	-	Not less than 78.0 or more than 82.0 per cent.
Total Impurities	-	-	-	-	Not more than 1.25 per cent.
of which Lead	-	-	-	-	must not exceed 1.00 per cent.
Zinc	-	-	-	-	The remainder.

(b) The Manufacturer shall supply, when required, the analysis of the bars to the Inspector.

2. **Methods of Manufacture.** The bars shall be delivered in the extruded, rolled, forged, extruded and drawn or rolled and drawn condition.

3. **Freedom from Defects.** (a) The bars shall be free from defects.

(b) Any bar may be rejected for faults in manufacture notwithstanding that it has been previously passed on analysis and mechanical test.

4. **Margins of Manufacture.** The margins of manufacture for all bars except forged bars shall comply with Tables I and II.

NOTE:—The margins of manufacture for forged bars should be agreed individually between the Purchaser and the Manufacturer.

5. **Mechanical Tests.** (a) The bars must comply with the following tests, which shall be carried out in the presence of the Inspector and to his satisfaction.

(b) *Tensile Test.* Test pieces selected as specified in Clause 6 shall be machined to a form having a gauge length of four times the square root of the area.

In the case of bars over $1\frac{1}{8}$ inches diameter or width across flats, the longitudinal axis of the test piece shall be $\frac{9}{16}$ inch from the outside of the bar.

The testing appliances shall be such that the load when applied shall be axial.

Should a tensile test piece break outside the middle half of its gauge length the test may be discarded and another test made.

When tested in tension, the test pieces must give the following results :—

Maximum Stress. Tons per sq. in.	Elongation per cent.
Not less than :— 20	Not less than :— 25

The fractured test pieces must show freedom from piping or other defects.

(c) *Bend Test.* Bend test pieces selected as specified in Clause 6 must withstand without cracking being bent through an angle of 120°, over a radius equal to the diameter of the test piece.

Bars up to and including 1½ inches diameter or width across flats shall be tested full size. From larger bars, test pieces 1½ inches diameter shall be turned eccentrically from the bar so that the test pieces include the skin at one side. Such test pieces shall be bent with the skin in tension.

(d) *Brinell (or other approved) Hardness Test.* A Brinell (or other approved) hardness test shall be carried out on a small flat filed on the circumference of each tensile test sample before machining, and on the circumference of one end of 10 per cent. of the bars in each parcel. The hardness number of the bars tested shall approximate sufficiently closely to that on the tensile test sample to determine that the material is homogeneous.

6. **Selection of Test Samples.** (a) Bars of the same diameter or width across flats shall be grouped in parcels of six (out of the same cast), or 3 cwt. whichever may be the larger weight.

The Inspector shall select from each parcel one bar from which a test sample shall be cut in a direction parallel to the length of the bar, for the tests specified in Clause 5.

(b) These test samples shall be marked as directed by the Inspector before they are cut off, and shall not be heat-treated, hammered or otherwise treated before they are tested.

7. **Re-Tests.** If a sample selected for testing fails to meet the requirements of the Specification, two other bars in the same parcel shall be selected by the Inspector and tested in the same manner. If either of these samples fails to meet the requirements of the Specification, the whole parcel represented may be rejected.

8. **Identification.** (a) All bars, half-inch diameter or width across flats and over passed by the Inspector, shall be stamped with the Specification Number, the identification mark of the Inspector, and the Manufacturer's trade mark or symbol. All such stamping must be done at one extreme end of each bar.

(b) All bars under half-inch diameter or width across flats, passed by the Inspector, shall be wired up in bundles which shall bear a metal tag stamped with the Specification Number, the identification mark of the Inspector, and the Manufacturer's trade mark or symbol.

TABLE I.
MARGINS OF MANUFACTURE.
ROUND AND SQUARE BARS.

1	2	3	4
	Extruded.	Rolled.	Drawn (after extrusion or rolling).
Nominal Size of Bar (Diameter or Width across Flats).	Margin of Manufacture.	Margin of Manufacture.	Margin of Manufacture.
	plus or minus.	plus.	minus.
in.	in.	in.	in.
$\frac{1}{4}$ (0.25)	0.002	0.010	0.002
$\frac{5}{16}$ (0.3125)	0.002	0.010	0.002
$\frac{3}{8}$ (0.375)	0.002	0.010	0.002
$\frac{7}{16}$ (0.4375)	0.002	0.010	0.002
$\frac{1}{2}$ (0.5)	0.003	0.010	0.002
$\frac{9}{16}$ (0.5625)	0.003	0.010	0.002
$\frac{5}{8}$ (0.625)	0.003	0.010	0.002
$\frac{3}{4}$ (0.75)	0.003	0.010	0.002
$\frac{7}{8}$ (0.875)	0.003	0.010	0.003
1	0.004	0.015	0.003
$1\frac{1}{8}$ (1.125)	0.004	0.015	0.003
$1\frac{1}{4}$ (1.25)	0.004	0.015	0.003
$1\frac{3}{8}$ (1.375)	0.004	0.020	0.003
$1\frac{1}{2}$ (1.5)	0.005	0.020	0.004
$1\frac{5}{8}$ (1.625)	0.005	0.020	0.004
$1\frac{3}{4}$ (1.75)	0.005	0.020	0.004
$1\frac{7}{8}$ (1.875)	0.006	0.025	0.004
2	0.006	0.025	0.004
Over 2 and up to and including 3	Plus or minus 0.5 per cent.		
Over 3	Plus or minus 1.0 per cent.		

NOTE.—Any bar intermediate between the sizes given in Column 1 shall have the margins of manufacture of the next size larger.

TABLE II.
HEXAGON BARS.

1			2			3			4			5			6			7			8			9			10			11		
Extruded or Rolled Bars						Drawn Bars						Corresponding Sizes of Bright Hexagon Nuts and Bolt-heads																				
Width across flats		Margin of Manufacture	Width across flats		Margin of Manufacture	Nominal Size			Width across flats																							
max.	min.		max.	min.		B.S.W.	B.S.F.	B.A.	max.	min.																						
in.	in.	in.	in.	in.	in.	in.	in.	in.	No.	in.	in.																					
0.117	0.114	0.003	0.117	0.115	0.002	—	—	10	0.117	0.115																						
0.152	0.149	0.003	0.152	0.150	0.002	—	—	8	0.152	0.150																						
0.193	0.189	0.004	0.193	0.191	0.002	—	—	6	0.193	0.190																						
0.248	0.244	0.004	0.248	0.246	0.002	—	—	4	0.248	0.245																						
0.282	0.278	0.004	0.282	0.280	0.002	—	—	3	0.282	0.279																						
0.324	0.320	0.004	0.324	0.322	0.002	—	—	2	0.324	0.321																						
0.365	0.361	0.004	0.365	0.363	0.002	—	—	1	0.365	0.362																						
0.413	0.409	0.004	0.413	0.411	0.002	—	$\frac{7}{32}$	0	0.413	0.410																						
0.445	0.441	0.004	0.445	0.443	0.002	—	$\frac{1}{4}$	—	0.445	0.440																						
0.525	0.521	0.004	0.525	0.523	0.002	$\frac{1}{4}$	$\frac{5}{16}$	—	0.525	0.520																						
0.565	0.561	0.004	0.565	0.563	0.002	—	$1\frac{1}{2}$	—	0.565	0.560																						
0.600	0.596	0.004	0.600	0.597	0.003	$\frac{5}{16}$	$\frac{3}{8}$	—	0.600	0.595																						
0.655	0.651	0.004	0.655	0.652	0.003	—	$1\frac{3}{32}$	—	0.655	0.650																						
0.710	0.706	0.004	0.710	0.707	0.003	$\frac{3}{8}$	$\frac{7}{16}$	—	0.710	0.705																						
0.765	0.760	0.005	0.765	0.762	0.003	—	$1\frac{5}{32}$	—	0.765	0.760																						
0.820	0.815	0.005	0.820	0.817	0.003	$\frac{7}{16}$	$\frac{1}{2}$	—	0.820	0.815																						
0.920	0.915	0.005	0.920	0.917	0.003	$\frac{1}{2}$	$\frac{9}{16}$	—	0.920	0.915																						
1.010	1.005	0.005	1.010	1.006	0.004	$\frac{9}{16}$	$\frac{5}{8}$	—	1.010	1.002																						
1.100	1.095	0.005	1.100	1.096	0.004	$\frac{5}{8}$	$1\frac{1}{16}$	—	1.100	1.092																						
1.200	1.195	0.005	1.200	1.196	0.004	$1\frac{1}{16}$	$\frac{3}{4}$	—	1.200	1.192																						
1.300	1.295	0.005	1.300	1.296	0.004	$\frac{3}{4}$	$\frac{7}{8}$	—	1.300	1.292																						
1.390	1.384	0.006	1.390	1.386	0.004	—	$1\frac{5}{16}$	—	1.390	1.382																						
1.480	1.474	0.006	1.480	1.476	0.004	$\frac{7}{8}$	1	—	1.480	1.468																						
1.670	1.664	0.006	1.670	1.666	0.004	1	$1\frac{1}{8}$	—	1.670	1.658																						
1.860	1.854	0.006	1.860	1.856	0.004	$1\frac{1}{8}$	$1\frac{3}{4}$	—	1.860	1.845																						
2.050	2.042	0.008	2.050	2.046	0.004	$1\frac{3}{4}$	$1\frac{5}{8}$	—	2.050	2.035																						
2.220	2.212	0.008	—	—	—	$1\frac{5}{8}$	$1\frac{1}{2}$	—	2.220	2.200																						
2.410	2.402	0.008	—	—	—	$1\frac{1}{2}$	$1\frac{3}{4}$	—	2.410	2.390																						
2.580	2.570	0.010	—	—	—	$1\frac{5}{8}$	$1\frac{3}{4}$	—	2.580	2.555																						
2.760	2.750	0.010	—	—	—	$1\frac{3}{4}$	2	—	2.760	2.735																						
3.150	3.140	0.010	—	—	—	2	—	—	3.150	3.125																						

NOTE.—Any bar intermediate between the sizes given in the above Table shall have the margins of manufacture of the next size larger.

This Specification having been approved by the Aircraft Industry Committee and endorsed by the Chairman of the Engineering Divisional Council, was published by the authority of the General Council as a British Standard on 3rd April, 1933.

NOTE.

In order to keep abreast of progress in the Industries concerned, the British Standard Specifications are subjected to periodical review.

Suggestions for improvements, addressed to the British Standards Institution, 28 Victoria Street, London, S.W. 1, will be welcomed at all times. They will be recorded and in due course brought to the notice of the Committees charged with the revision of the Specifications to which they refer