

**Ministry of Defence
Defence Procurement Agency, ADRP2
Abbey Wood
Bristol
BS34 8JH**

OBSOLESCENCE NOTICE

All DTD specifications were declared obsolescent from 1st April 1999. All DTD 900 series approvals also lapsed at that time. The standards will no longer be updated but will be retained as obsolescent documents to provide for the servicing of existing equipment.

Further Guidance

The aim in declaring the specifications obsolescent is to recognise that the documents are not being updated and thus should be used with care by both purchaser and supplier. For example, a specification could contain valid technical information but may also contain type approval clauses that contradict procurement policy and/or use materials that do not comply with environmental legislation. The obsolescent specification can still be used as a basis for a purchase provided that the supplier and purchaser agree suitable changes to the specification within the purchase order/contract.

For the DTD 900 system, each specification has provided an MoD approved material and process. For these items, the declaration of obsolescence will constitute the termination of both the extant MoD approval and the continuing MoD assessment that had underpinned those approvals. Again, the technical content of the document remains valid and can be used by both purchaser and supplier as a basis for a contract but an acceptable (to the parties) approval/assessment procedure would be required.

Aircraft Material Specification
HARD-DRAWN PHOSPHOR BRONZE BARS AND TUBES

(Suitable for bushes, etc.)

(Bars not exceeding 2½ inches diameter)

NOTE.-This specification is one of a series issued by the Ministry of Supply, either to meet a limited requirement not covered by any existing British Standard Specification or to serve as a basis for inspection of materials the properties and uses of which are not sufficiently developed to warrant submission to the British Standards Institution for standardisation.

The specific gravity of this alloy is not greater than 8.95.

1. Chemical Composition

(a) The chemical composition of the alloy shall be :-

- Tin not less than 7.5 nor more than 9.0 per cent.
- Phosphorus not less than 0.1 nor more than 0.4 per cent.
- Total impurities (including iron, lead, zinc and nickel) not more than 0.2 per cent.
- Copper.. .. the remainder.

(b) The analysis of not less than 5 per cent. of the casts of alloy shall be submitted to the Inspector. The minimum number of analyses required may be increased by the Inspector if he is not satisfied with the conditions of manufacture.

2. Manufacture

The bars shall be supplied as rolled or as drawn, and the tubes shall be supplied as extruded or as drawn.

3. Freedom from Defects

(a) The material shall be free from defects.

(b) Any material may be rejected for faults in manufacture, although it has been passed previously on chemical composition and mechanical tests.

4. Margins of Manufacture

(a) The margins of manufacture of the bars shall comply with Tables 1 and 2, and those of the tubes with Table 3.

(b) The margins of manufacture of the extruded sections shall be agreed between the Manufacturer and the Purchaser.

5. Selection and Preparation of Mechanical Test Samples

(a) (i) Bars of the same nominal diameter or width across the flats shall be grouped in parcels as follows:-

Cross Sectional Diameter or Width across Flats	Maximum Size of Parcel
Up to and including ½ in.	3 cwt.
Over ½ in. up to and including 2½ in.	10 cwt.
Over 2½ in.	40 cwt. or 100 ft., whichever is the greater weight.

(ii) Tubes of the same nominal diameter and thickness shall be grouped in parcels as follows :-

Weight per foot run	Maximum Size of Parcel
Less than 1 lb.	500 ft.
1 lb. and up to and including 10 lb.	5 cwt.
Over 10 lb.	50 ft.

(iii) After being tested for hardness as specified in Clause 6, a sample shall be cut from the bar or tube of the lowest hardness number in each parcel for the tensile test specified in Clause 7.

(b) The test samples shall be marked as directed by the Inspector, and shall be removed from the bars by nicking and breaking off or they may be sawn and, after separation from the bar, fractured. The fractured surfaces must show freedom from pipe or other defect. The test samples shall be removed from the tubes by sawing.

(c) The test samples shall not be heat treated or mechanically worked before being tested.

(d) (i) For bars up to and including 1½ inches diameter or width across flats, the tensile test piece shall be machined concentrically from the test sample.

(ii) For bars over 1½ inches up to and including 2½ inches diameter or width across flats, the longitudinal axis of the tensile test piece shall be $\frac{1}{16}$ inch from the surface of the test sample.

(e) From test samples representing bars the test pieces shall be machined to the dimensions of British Standard Test Piece C (a suitable test piece is shown in Fig. 1) or, if the samples are too small, to a similar form having the same geometric proportions.

For tubes, the test pieces shall be either the selected test samples as cut from the tubes or strips machined therefrom.

The parallel portion of the test piece may be increased in length to accommodate the extensometer employed.

The load shall be applied axially. Should a tensile test piece break outside the middle half of its gauge length, the test may be discarded and another test made.

6. Hardness Test

(a) A hardness test shall be carried out by an approved method on small flats prepared on the periphery of all the bars and tubes in each parcel specified in Clause 5 (a), and the hardness number obtained must comply with the values specified in Clause 7 (b).

(b) The hardness determinations shall be carried out according to British Standard 240 for the Brinell hardness or, at the option of the Manufacturer, according to British Standard 427 for the Diamond Pyramid hardness, so far as either is applicable. In all Brinell tests the value P/D^2 shall be 10 and the load and ball arranged accordingly.

7. Mechanical Tests

(a) *Tensile test.*- The mechanical properties of the test pieces machined from the samples selected and prepared as specified in Clause 5 must pass the following tests to the satisfaction of the Inspector:-

Ultimate tensile stress not less than 30 tons per sq. in.

Elongation on 4√ area not less than 20 per cent.

Note.- An elongation of not less than 10 per cent. will be accepted for tubes having a wall thickness/inside diameter ratio of 1/5 or greater.

The fractured test pieces must show freedom from pipe or other defect.

(b) *Hardness Test.*- Brinell hardness number (or equivalent on the scale of the method adopted) not less than 120.

8. Re-Tests

(a) If any test piece fails to pass the tensile test specified in Clause 7 (a), the Inspector shall select for test from the same parcel two other samples; one of these must be from the bar or tube from which the original test sample was taken unless that bar or tube has been withdrawn by the Manufacturer. Test pieces prepared from these two further samples as specified in Clause 6 must pass the tensile test specified in Clause 7 (a).

(b) If any bar or tube fails to pass the hardness test specified in Clause 7 (b), the bar or tube shall be rejected, or shall be subjected, to a tensile test.

9. Identification

(a) All tubes and bars under ½ inch diameter or width across flats and from the same cast, passed by the Inspector, shall be tied up in bundles, which shall bear a tag stamped with the mark of the Inspector and such other marking as will ensure full identification of the material.

(b) All bars and tubes $\frac{1}{2}$ inch diameter or width across flats and over, passed by the Inspector, shall be stamped with the mark of the Inspector and such other marking as will ensure full identification of the material.

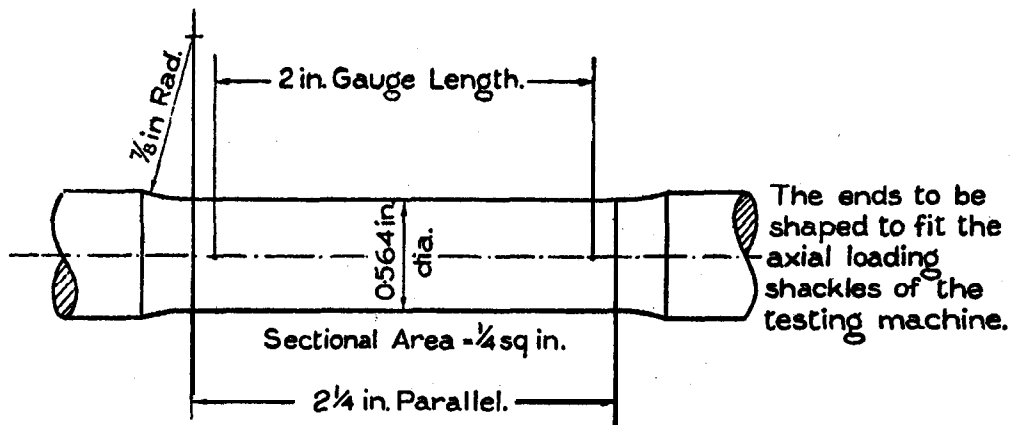


Fig. 1.- Tensile Test Piece.

MARGINS OF MANUFACTURE

Table 1.- ROUND AND SQUARE BARS

1	2	3	4
Nominal Size of Bar (Diameter or Width across Flats)	Extruded	Rolled	Drawn (after extrusion of rolling)
	Margin of Manufacture. Plus or Minus	Margin of Manufacture. Plus	Margin of Manufacture. Minus
in.	in.	in.	in.
$\frac{1}{8}$ (0.25)	0.002	0.010	0.002
$\frac{3}{16}$ (0.3125)	0.002	0.010	0.002
$\frac{1}{4}$ (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 2.-HEXAGON BARS

1		2		3		4		5		6	
Extruded or Rolled Bars						Drawn Bars					
Width across Flats		Margin of Manufacture		Width across Flats		Margin of Manufacture					
Max.	Min.			Max.	Min.						
in.	in.	in.		in.	in.	in.					
0.117	0.114	0.003		0.117	0.115	0.002					
0.152	0.149	0.003		0.152	0.150	0.002					
0.193	0.189	0.004		0.193	0.191	0.002					
0.248	0.244	0.004		0.248	0.246	0.002					
0.282	0.278	0.004		0.282	0.280	0.002					
0.324	0.320	0.004		0.324	0.322	0.002					
0.365	0.361	0.004		0.365	0.363	0.002					
0.413	0.409	0.004		0.413	0.411	0.002					
0.445	0.441	0.004		0.445	0.443	0.002					
0.525	0.521	0.004		0.525	0.523	0.002					
0.565	0.561	0.004		0.565	0.563	0.002					
0.600	0.596	0.004		0.600	0.597	0.003					
0.655	0.651	0.004		0.655	0.652	0.003					
0.710	0.706	0.004		0.710	0.707	0.003					
0.765	0.760	0.005		0.765	0.762	0.003					
0.820	0.815	0.005		0.820	0.817	0.003					
0.920	0.915	0.005		0.920	0.917	0.003					
1.010	1.005	0.005		1.010	1.006	0.004					
1.100	1.095	0.005		1.100	1.096	0.004					
1.200	1.195	0.005		1.200	1.196	0.004					
1.300	1.295	0.005		1.300	1.296	0.004					
1.390	1.384	0.006		1.390	1.386	0.004					
1.480	1.474	0.006		1.480	1.476	0.004					
1.670	1.664	0.006		1.670	1.666	0.004					
1.860	1.854	0.006		1.860	1.856	0.004					
2.050	2.042	0.008		2.050	2.046	0.004					
2.220	2.212	0.008		—	—	—					
2.410	2.402	0.008		—	—	—					
2.580	2.570	0.010		—	—	—					
2.760	2.750	0.010		—	—	—					
3.150	3.140	0.010		—	—	—					
Above 3.150		±1.0 per cent.		—	—	—					

Note.-Any bar intermediate between the sizes given in the above table shall have the margins of manufacture of the next size larger.

Table 3.-TUBES

The outside and inside diameters and mean thickness shall not vary from the nominal dimensions by more than the following tolerances:-

Outside and Inside Diameters

Nominal.		Tolerance.	
Up to and including $\frac{1}{2}$ in. outside diameter	.. .. .	± 0.003 in.	
Over $\frac{1}{2}$ in. up to and including $1\frac{1}{2}$ in. outside diameter	.. .. .	± 0.005 in.	
Over $1\frac{1}{2}$ in. and up to $2\frac{1}{2}$ in. outside diameter	.. .. .	± 0.007 in.	
Over $2\frac{1}{2}$ in. outside diameter	.. .. .	± 0.5 per cent.	

Wall Thickness

Nominal.		Tolerance.	
$\frac{1}{8}$ in. and under	± 0.010 in.	
Over $\frac{1}{8}$ in. to $\frac{1}{4}$ in.	± 0.0125 in.	
Over $\frac{1}{4}$ in. to $\frac{3}{8}$ in.	± 0.015 in.	
Over $\frac{3}{8}$ in.	± 0.040 in.	

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