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British Standards Institution

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FORMED IN 1901 AS THE ENGINEERING STANDARDS COMMITTEE.

INCORPORATED IN 1918 AS THE BRITISH ENGINEERING STANDARDS ASSOCIATION.

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issue*

**BRITISH STANDARD
SPECIFICATION**

FOR

BRASS BARS

(HIGH SPEED SCREWING AND TURNING).

(REVISED MAY, 1940.)

LONDON

PUBLISHED BY THE BRITISH STANDARDS INSTITUTION,

PUBLICATIONS DEPARTMENT,

25, VICTORIA STREET, LONDON, S.W.1.

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May, 1940.

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This Specification, having been approved by the Non-Ferrous Metallurgy Industry, and endorsed by the Engineering Divisional Council, was published under the authority of the General Council on 20th May, 1940.

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(2)

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(3)

CO-OPERATING ORGANISATIONS.

The Non-Ferrous Metallurgy Industry Committee under whose supervision this British Standard was prepared consists of representatives from the following Government Departments, Professional Institutions and Industrial and Trade Organisations:—

*Admiralty.
 *Air Ministry.
 Crown Agents for the Colonies.
 General Post Office.
 High Commissioner for India.
 *Ministry of Supply.
 *War Office.
 Brass and Copper Tube Association.
 Brass Founders Employers' Association.
 Brass Wire Association.
 *British Electrical and Allied Manufacturers' Association.
 *British Non-Ferrous Metals Research Association.
 Cable Makers' Association.
 *Cold Rolled Brass and Copper Association.
 High Conductivity Copper Association.
 Institute of British Foundrymen.
 *Institute of Metals.
 Institution of Automobile Engineers.
 Institution of Mining and Metallurgy.
 London Metal Exchange.
 Manufactured Copper Association.
 Nickel Silver Association.
 Sheet Makers' Conference.
 Society of British Aircraft Constructors.
 Society of Motor Manufacturers and Traders.
 United Kingdom Lead Manufacturers' Association.

The Government Departments and Scientific and Industrial Organisations marked with an asterisk in the above list, together with the following, were directly represented on the Committees entrusted with the preparation of this British Standard:—

National Physical Laboratory (D.S.I.R.).
 Association of Drop Forgers and Stampers.
 British Corporation and Register of Shipping and Aircraft.
 Copper Development Association.
 Lloyds Register of Shipping.

(4)

FOREWORD.

This Specification forms part of a series of British Standards for non-ferrous metals and alloys, the preparation of which was authorised by the Non-Ferrous Metallurgy Industry Committee.

The present revision was undertaken in accordance with the general practice periodically to review all British Standards in order to keep them up to date. In order to secure uniformity the opportunity has been taken to re-draft the clauses which cover similar requirements in all the Specifications of this series for copper alloy bars.

As a result of the joint proposals of the Air Ministry and the Society of British Aircraft Constructors that certain of the British Standards for Aircraft purposes should be replaced by corresponding British Standards for general purposes this revised Specification replaces 3B.13.—Brass Bars (High Speed Screwing and Turning).

This Specification requires reference to the following British Standard :—

No. 18.—Tensile Testing of Metals.

In order to keep abreast of progress in the Industries concerned, the British Standards are subject 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 Publications to which they refer.

(5)

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 include all the necessary provisions of a contract.

BRITISH STANDARD
SPECIFICATION

FOR

BRASS BARS
(HIGH SPEED SCREWING AND TURNING.)

FOR BARS OF CROSS SECTION FALLING WITHIN A CIRCUMSCRIBING CIRCLE
OF 5 IN. (127.00 MM.) DIAMETER. 10

(REVISED MAY, 1940.)

The figures in British measures are to be regarded as the Standard. Approximate metric equivalents are given for the convenience of users in countries in which the metric system has been generally adopted. 15

Chemical Composition.

1. The chemical composition of the bars shall be :—

Copper ... Not less than 55.0 nor more than 60.0
per cent.

Lead ... Not less than 2.0 nor more than 3.5 per 20
cent.

Total impurities ... Not more than 0.75 per cent.

Zinc ... The remainder.

The Manufacturer shall, when required, supply free of charge,
a copy of his works analysis* of the material. 25

Methods of Manufacture.

2. The bars may be delivered in the extruded, rolled, extruded
drawn, or rolled and drawn condition.

Freedom from Defects.

3. The bars shall be sound, reasonably straight, and free 30
from twists.

*A "works analysis" is defined as the routine analysis taken by or
for the Manufacturer in order to control the quality of the material.

(6)

Any material may be subsequently rejected for faults in manufacture notwithstanding that it has been passed previously on chemical composition and mechanical tests.

Margins of Manufacture.

4. The margins of manufacture shall be those given in Tables 1 and 2, Appendix B. 5

Provision of Test Pieces.

5. For the purpose of the tensile test specified in Clause 6, the bars shall be grouped in batches or parcels and one sample shall be selected from each to provide the necessary test pieces. 10
The nominal size of the bars in each batch or parcel shall not differ in diameter or width across flats by more than $\frac{1}{4}$ inch (6.35 mm.) for bars up to and including three inches (76.20 mm.) nominal size or by more than $\frac{1}{2}$ inch (12.70 mm.) for bars over three inches nominal size. The size of each batch or parcel 15 shall be as follows:—

Nominal size (diameter or width across flats) of bars.	Maximum size of batch or parcel.	
Up to and including $\frac{1}{2}$ in. (12.70 mm.)	5 cwt. (560 lb. = 254.0 kg.)	
Over $\frac{1}{2}$ in. (12.70 mm.) up to and including $1\frac{1}{2}$ in. (38.10 mm.) ...	10 cwt. (1 120 lb. = 508.0 kg.)	20
Over $1\frac{1}{2}$ in. (38.10 mm.) up to and including 3 in. (76.20 mm.) ...	20 cwt. (2 240 lb. = 1 016.1 kg.)	
Over 3 in. (76.20 mm.) ...	40 cwt. (4 480 lb. = 2 032.1 kg.)	

The test samples shall be cut from the bars by nicking and 25 breaking off, and the fractures shall show freedom from piping and from other defects.

Tensile Test.

6. The bars as supplied shall comply with the following test:— 30

(a) One test piece from every sample selected shall be turned to the dimensions of British Standard tensile test piece C or, if the bars are too small, to the dimensions of one of the subsidiary standard test pieces given in Appendix A, and shall show an ultimate tensile stress of not less than 25 tons (56 000 lb.) per 35 sq. in. (39.37 kg. per sq. mm.) with an elongation of not less than 20 per cent.

(7)

(b) In the case of bars over $1\frac{1}{2}$ in. (28.58 mm.) diameter or width across flats, the longitudinal axis of the test piece shall be $\frac{1}{16}$ in. (1.59 mm.) from the outside of the bar.

(c) The fractured test piece shall show freedom from piping and from other defects. 5

(d) Should a tensile test piece break outside the middle half of its gauge length (see Fig. 2, Appendix A), the test may be discarded at the option of the Manufacturer and another test made.

Re-tests.

7. If a sample selected for testing fails to meet the specified requirements, the Purchaser or his representative shall select from the same batch or parcel, two other samples, one of which must be from the bar from which the original test sample was taken, unless that bar has been withdrawn by the Manufacturer. 15
If, on testing as specified in Clause 6, either of these samples fails to meet the specified requirements the whole batch or parcel may be rejected.

Inspection.

8. The Purchaser or his representative shall be at liberty 20 to reject any material that does not conform to the terms of this Specification. He may attend to stamp samples for testing before delivery and no bar will be accepted which will not comply with the specified tests, or which, upon analysis, is found not to conform to the limits stated for chemical composition. 25

Testing Facilities.

9. For orders of 3 cwt. (336 lb. = 152.4 kg.) or more of any one size of bar the Manufacturer shall supply the material required for testing free of charge and shall, at his own cost, furnish and prepare the necessary test pieces, and supply labour and appliances 30 for such testing as is carried out on his premises in accordance with this Specification. Failing facilities at his own works for making the prescribed tests, the Manufacturer shall bear the cost of carrying out the tests elsewhere.

APPENDIX A.

DIMENSIONS OF TENSILE TEST PIECES.

TEST PIECE C (0.564 IN. DIAMETER) AND SMALLER SUBSIDIARY STANDARD ROUND TENSILE TEST PIECES.*

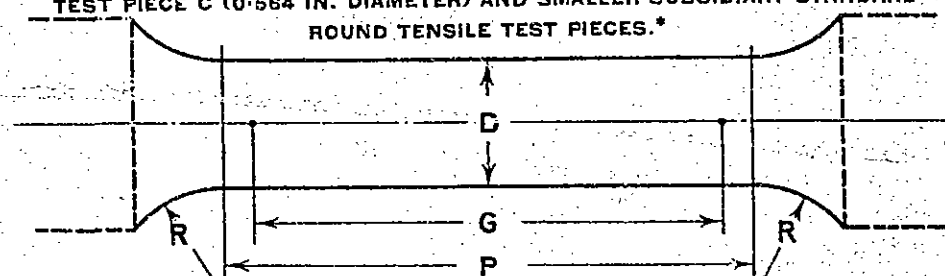


Fig. 1 Subsidiary Standard Round Test Pieces.

$$\text{Cross-sectional area } A = \frac{D^2 \pi}{4}$$

$$\text{Gauge length } G = 4 \sqrt{A} = 3.54 D.$$

$$\text{Parallel length } P = \frac{9}{8} G \text{ minimum} = 3.98 D \text{ minimum.}$$

$$\text{Radius } R \text{ at shoulder for wrought metals} = \frac{G}{4} \text{ minimum.} \\ (\text{0.88 } D \text{ minimum}).$$

Diameter. D	Cross-sectional area. A	Gauge length. G	Parallel length. P (minimum.)	Radius at shoulder. R (minimum.) Wrought metal.
in.	sq. in.	in.	in.	in.
0.564	0.2500	2.00	2.25	0.50
0.424	0.1412	1.50	1.69	0.37
0.399	0.1250	1.41	1.58	0.35
0.357	0.1000	1.26	1.42	0.31
0.282	0.0625	1.00	1.12	0.25
0.226	0.0400	0.80	0.90	0.20
0.159	0.0200	0.56	0.63	0.14
0.125	0.0122	0.44	0.50	0.11

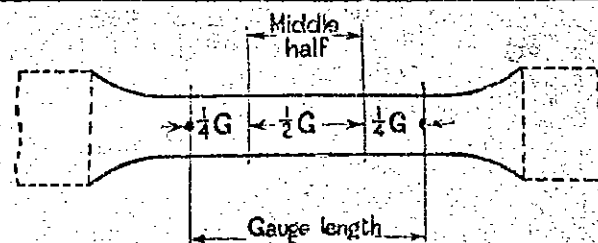


Fig. 2. Sketch Illustrating Middle Half of Gauge Length.

*Abstracted from B.S.18 Tensile Testing of Metals.

APPENDIX

MARGINS OF

TABLE 1.—ROUND

1	2
Nominal size of bar (diameter or width across flats).	Extruded Margin of manufacture plus or minus
in.	in.
1/4 (0.25)	0.002
5/16 (0.3125)	0.002
3/8 (0.375)	0.002
7/16 (0.4375)	0.002
1/2 (0.5)	0.003
9/16 (0.5625)	0.003
5/8 (0.625)	0.003
3/4 (0.75)	0.003
7/8 (0.875)	0.003
1	0.004
1 1/8 (1.125)	0.004
1 1/4 (1.25)	0.004
1 3/8 (1.375)	0.004
1 1/2 (1.5)	0.005
1 5/8 (1.625)	0.005
1 3/4 (1.75)	0.005
1 7/8 (1.875)	0.006
2	0.006
Over 2 and up to and including 3	± 0.5 per
Over 3 up to and including 4	± 1.0 per
Over 4	± 1.0 per

NOTE.—Any bar intermediate shall have the margins of manu-

1	2	3
Extruded bars.		
Width across flat.		Margin of manu- facture
max.	min.	in.
0.117	0.114	0.003
0.152	0.149	0.003
0.193	0.189	0.003
0.248	0.244	0.004
0.282	0.278	0.004
0.324	0.320	0.004
0.365	0.361	0.004
0.413	0.409	0.004
0.445	0.441	0.004
0.525	0.521	0.004
0.600	0.596	0.004
0.710	0.706	0.004
0.820	0.815	0.005
0.920	0.915	0.005
1.010	1.005	0.005
1.100	1.095	0.005
1.200	1.195	0.005
1.300	1.295	0.005
1.480	1.474	0.006
1.670	1.664	0.006
1.860	1.854	0.006
2.050	2.042	0.008
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
Over 3.150	...	± 1.0 per cent

NOTES.—1. Any bar intermediate of manufacture.

2. The particulars No. 57 "Heat" and No. 191 "Heat"