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Full document details: BS 24-5:1924

No. 24—Part 5.

Specification No. 11—1924.

CANCELLED

DRAFT REVISED SPECIFICATION

British Engineering Standards Association.

(*Incorporated 1918*).

Formed in 1901 as The Engineering Standards Committee
by
The Institution of Civil Engineers,
The Institution of Mechanical Engineers,
The Institution of Naval Architects,
The Iron and Steel Institute,
The Institution of Electrical Engineers.

BRITISH STANDARD SPECIFICATION FOR COPPER PLATES FOR LOCOMOTIVE FIRE BOXES.

(REVISED 1924).

LONDON:
Published for the Association by CROSBY LOCKWOOD & SON,
7, Stationers' Hall Court, Ludgate Hill, London, E.C. 4;
and to be purchased from any bookseller or direct from the offices of the
BRITISH ENGINEERING STANDARDS ASSOCIATION,
28, Victoria Street, London, S.W. 1.

July, 1924.

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The following Authorities have officially co-operated in the preparation of this Specification :—

Admiralty.
War Office.
India Office.
Air Ministry.
Crown Agents for the Colonies.
General Post Office.
National Physical Laboratory.
Institute of Metals.
Institution of Automobile Engineers.
Association of Railway Locomotive Engineers.
British Non-Ferrous Metals Research Association.
Railway Companies' Association.
Association of British Motor Manufacturers.
Brass and Copper Tube Association.
Brass Wire Association.
Brassfounders' Employers' Association.
British Electrical and Allied Manufacturers' Association.
Cold Rolled Brass and Copper Association.
High Conductivity Copper Association.
Locomotive Manufacturers' Association.
Manufactured Copper Association.
Society of British Aircraft Constructors, Limited.
Society of Motor Manufacturers and Traders, Limited.

This Specification was adopted by the Sectional Committee on Non-Ferrous Alloys at their Meeting on 11th February, 1924, and by the Sectional Committee on Locomotives at their Meeting on 17th March, 1924, and was approved on behalf of the Main Committee on 19th July, 1924.

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 Secretary, British Engineering Standards Association, 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.

No. 24—Part 5.

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BRITISH

STANDARD SPECIFICATION

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NOTE.—*The Association 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 COPPER PLATES FOR LOCOMOTIVE FIRE BOXES.

(REVISED 1924).

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.

Quality of Material.

1. The Plates shall contain not less than 99·20 per cent of copper, and shall contain not less than 0·30 per cent nor more than 0·50 per cent of arsenic.

The Manufacturer shall supply an analysis when required to do so.

Freedom from Defects.

2. The Plates shall be clean, smooth, free from surface defects, and shall be thoroughly annealed.

Marking.

3. Each Plate shall be stamped with the Manufacturer's name and plate number, about 12 inches (say 300 mm.) from the end in the centre line of the Plate, and shall also be distinctly stamped with such marks of identification as the Engineer (or the Purchaser) may require.

Mechanical Tests.

4. The scrap margin before shearing shall be not less than 3 inches (76·20 mm.) at each end, and 1½ inches (38·10 mm.) at each side of the Plate; from this margin a piece at each end 2 inches (50·80 mm.) wide shall be left attached to the Plate, from which the representative of the Engineer (or of the Purchaser) will mark lengths for tensile and bend tests. All test pieces shall comply with the following mechanical tests without further heat treatment.

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Tensile Test.

5. A Standard Test Piece **A** (*see* Appendix, page 6) shall show a tensile breaking strength of not less than 14 tons (31,360 lb.) per square inch (22 kg. per mm.^{2}), with an elongation of not less than 35 per cent.

Bend Test.

6. Test pieces shall be taken from the piece 2 inches (50·80 mm.) wide, described in Clause 4, and tested both cold and at a red heat by the ends being bent through an angle of 180° in opposite directions as shewn in Fig. 1, and doubled up close, without showing either crack or flaw on the outside of either bend. The edges of the test pieces shall be draw-filed to remove roughness and sharpness.

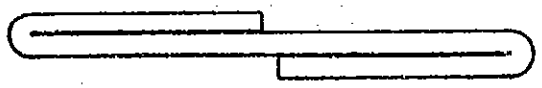

Fig. 1.

Additional Tests before Rejection.

7. Should any of the test pieces first selected by the representative of the Engineer (or of the Purchaser) fail to pass the chemical or mechanical tests, two further test pieces from the same Plate shall be selected for testing. Should either of these test pieces so selected fail as to the requirements of either the chemical or mechanical tests, the Plates represented by the test pieces shall be liable to rejection.

Inspection.

8. The representative of the Engineer (or the Purchaser) shall be at liberty to reject any material that does not conform to the terms of this Specification. He will attend to stamp pieces for testing before delivery, and no Plate will be accepted which will not stand the specified tests or which upon analysis is found not to conform to the limits stated for the chemical composition.

Testing Facilities.

9. 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 for such testing as may be 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.

FORMS

OF

BRITISH STANDARD TENSILE TEST PIECES.

Full document details: BS 24 : 1924
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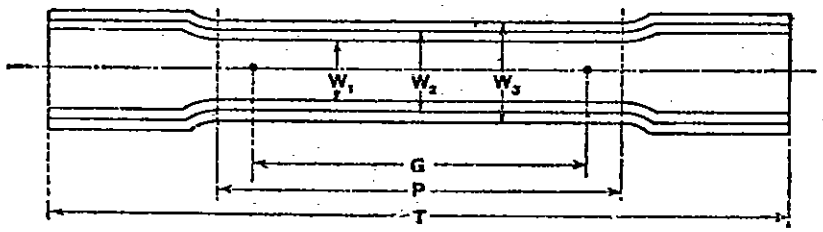
NOTE.—*The following memorandum is appended for general information The test piece applicable to Report No. 24—Specification No. 11—1924 (British Standard Specification for Copper Plates for Locomotive Fire Boxes) is Test Piece* **A.**

APPENDIX.

FORMS OF BRITISH STANDARD TENSILE TEST PIECES

TEST PIECE **A.**

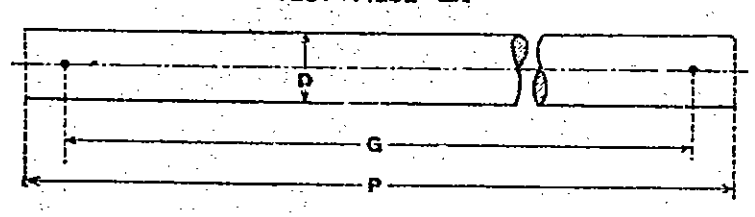


Gauge Length G = 8 inches (203·20 mm.)
Parallel Length P to be not less than 9 inches (228·60 mm.)
Total Length T = About 18 inches (457·20 mm.)

Thickness of Test Piece.	Maximum Width allowed.
Over $\frac{7}{8}$ in. (22·23 mm.)	W_1 = $1\frac{1}{2}$ in. (38·10 mm.)
$\frac{3}{8}$ in. to $\frac{7}{8}$ in. (9·53 to 22·23 mm.)	W_2 = 2 in. (50·80 mm.)
Under $\frac{3}{8}$ in. (9·53 mm.)	W_3 = $2\frac{1}{2}$ in. (63·50 mm.)

The widths of the test pieces for plates were selected to comply with the two following conditions. (1) As the great bulk of plates to be tested are from $\frac{3}{8}$ inch to $\frac{7}{8}$ inch (9·53 to 22·23 mm.) thick, it was desirable for the sake of convenience that the test pieces for such plates should be of uniform width, and, in accordance with very general practice, a width of 2 inches (50·80 mm.) was selected. (2) With a test piece of a given form, the percentage of elongation was found to be less for thick plates than for thin ones; with steel of the same quality in other respects it was desirable therefore to choose widths of test piece which would be slightly in favour of the thicker plates. This is secured with the widths selected for the Standard test piece of form **A.**

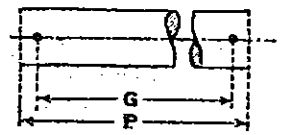
TEST PIECE **B.**



Gauge Length G to be not less than 8 times the diameter D.
With enlarged ends :—Parallel Length P to be not less than 9 times the reduced diameter D.

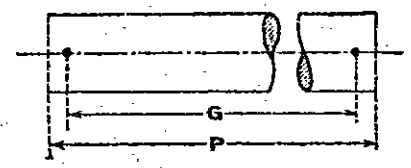
All test pieces of form **B** are strictly similar, and for the same material give the same percentage of elongation. They are nearly similar to a test piece of form **A**, 8 inches (203·20 mm.) in gauge length, 2 inches (50·80 mm.) wide and $\frac{3}{8}$ inch (9·53 mm.) thick.

TEST PIECE **C.**



Gauge Length G = 2 inches (50·80 mm.)
Parallel length P to be not less than $2\frac{1}{4}$ inches (57·15 mm.)
Dia. = 0·564 inch (14·33 mm.)
Area = $\frac{1}{4}$ sq. inch (161·29 mm.^{2})

TEST PIECE **D.**



Gauge Length G = 3 inches (76·20 mm.)
Parallel Length P to be not less than $3\frac{3}{8}$ inches (85·72 mm.)
Dia. = 0·798 inch (20·27 mm.)
Area = $\frac{1}{2}$ sq. inch (322·58 mm.^{2})

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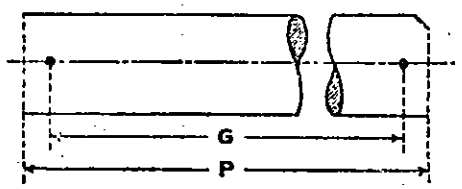
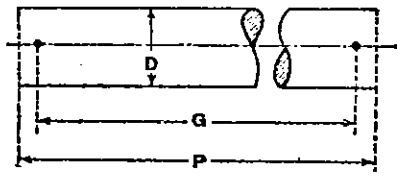
TEST PIECE **E.**



Gauge Length **G** = $3\frac{1}{2}$ inches (88·90 mm.)
Parallel Length **P** to be not less than 4 inches (101·60 mm.)
Dia. = 0·977 inch (24·82 mm.)
Area = $\frac{3}{4}$ sq. inch (483·87 mm.^{2})

Test Pieces **C, D** and **E** were arranged to meet the very common practice of making test pieces for forgings, axles, tyres, etc., of either $\frac{1}{4}$ square inch or $\frac{1}{2}$ square inch (161·29 or 322·58 mm.^{2}) in sectional area. With the gauge lengths decided upon, these three forms are very nearly similar, and, for a given material, give very approximately the same percentage of elongation. Though not exactly, they are approximately similar to the Standard Test Piece **F,** and for the same material give a nearly identical, but slightly greater, percentage of elongation.

TEST PIECE **F.**
(For Test Pieces over 1 inch (25·40 mm.) diameter.)



Gauge Length **G** to be not less than 4 times the diameter **D.**
With enlarged ends :— Parallel Length **P** to be not less than $4\frac{1}{2}$ times the reduced diameter **D.**

In some testing machines it was found inconvenient to use form **B** for bars of over 1 inch (25·40 mm.) in diameter, and form **F** of half the gauge length is designed to meet such cases. For a given material the percentage of elongation with Test Piece **F** is greater than with Test Piece **B,** and this difference is provided for in the British Standard Specifications.

FORM OF ENDS.

In the case of the round Test Pieces **B, C, D, E** and **F,** the form of the ends is to be as required in order to suit the various methods employed for gripping the test piece. When enlarged ends are used the length of the parallel portion of the test piece must in no case be less than that noted on the diagrams.

British Engineering Standards Association.

SELECTED LIST OF BRITISH STANDARD SPECIFICATIONS FOR NON-FERROUS MATERIAL.

REVISED TO DECEMBER, 1924.

Publication No.	Net.	Post free.
7-1922. **Copper Conductors, Insulated Annealed,** for Electric Power and Light, Dimensions of [See also No. 152-1922.]	1/-	1/2
24—Part V—Copper and Brass—		
No. 11-1921. Copper Plates for Locomotive Fire Boxes	1/-	1/2
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No. 12a-1924. Extruded Copper Rods for Locomotive Stay Bolts, Rivets, etc. Specification for	1/-	1/2
No. 13-1911. Copper Tubes for Locomotive Boilers.	1/-	1/2
No. 14-1911. Brass Tubes for Locomotive Boilers.		
No. 15-1911. Seamless Copper Tubes for Locomotive Feed Pipes, etc.		
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61-1913. **Copper Tubes** and their Screw Threads (primarily for domestic and similar work), Specification for	1/-	1/2
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