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BRITISH STANDARD SPECIFICATIONS FOR RAILWAY ROLLING STOCK MATERIAL.

PART 5.

COPPER PLATES, RODS, TUBES AND PIPES AND BRASS TUBES.

(REVISED 1924 and 1925.)

LONDON:
Published by the BRITISH STANDARDS INSTITUTION,
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February, 1925.

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The following Government Departments and Scientific and Industrial Organisations were represented upon the Sectional Committees, Sub-Committees and Panels entrusted with the preparation of these Specifications :—

Admiralty.
War Office.
India Office.
Air Ministry.
Crown Agents for the Colonies.
Board of Trade.
General Post Office.
National Physical Laboratory.
Institution of Mechanical Engineers.
Institution of Automobile Engineers.
Institute of Metals.
Association of Consulting Engineers.
Association of Railway Locomotive Engineers.
Incorporated Municipal Electrical Association.
Lloyd's Register of Shipping.
Railway Companies' Association.
British Non-Ferrous Metals Research 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.
Iron and Steel Trades Employers' Association.
Locomotive Manufacturers' Association.
Manufactured Copper Association.
Society of British Aircraft Constructors, Ltd.
Society of Motor Manufacturers and Traders, Ltd.
Steel Founders' Association of Great Britain.

Specifications Nos. 11 and 12 were 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. They were approved on behalf of the Main Committee on 19th July, 1924.

Specification No. 12a was adopted by the Sectional Committee on Non-Ferrous Alloys in April, 1924, and approved on behalf of the Sectional Committee on Locomotives on 24th July, 1924. It was approved on behalf of the Main Committee on 19th November, 1924.

Specifications Nos. 13, 14 and 15 were approved on behalf of the Sectional Committee on Non-Ferrous Alloys and the Sectional Committee on Locomotives in January, 1925. They were approved on behalf of the Main Committee on 2nd February, 1925.

NOTE.

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

Suggestions for improvements, addressed to the Director, 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.

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PART 4—1921. Steel Forgings, Blooms and Castings.

PART 6—1921. Steel Plates, Angles, etc., and Rivets for Locomotives, Carriages and Wagons.

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 20) 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 shown 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.

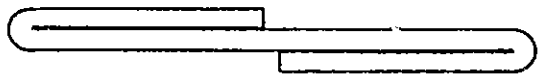

Fig. 1.

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.

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 ROLLED COPPER RODS FOR LOCOMOTIVE STAY BOLTS, RIVETS, ETC.

(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 Rods 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 Rods shall be clean, smooth, uniform in diameter and free from surface defects. The character of the material shall be ascertained by breaking off a small portion from one Rod in twenty-five. The material shall be free from piping or other defects of every description.

Marking.

3. Each Rod shall be stamped with the Manufacturer's name near one end.

Mechanical Tests.

4. The representative of the Engineer (or of the Purchaser) shall select and test such of the Rods as he may think proper up to two per cent. of each diameter of Rod ordered under the contract.

All test pieces shall withstand the following mechanical tests in the annealed condition, but, in the case of Rods ordered annealed, without any further heat treatment.

Tensile Test.

5. The tensile strength shall be not less than 14·50 tons (32,480 lb.) per square inch (23 kg. per mm.^{2}), with an elongation

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of not less than 40 per cent on Standard Test Piece **B** (*see* Appendix, page 21). For Rods up to 1¼ inches (31·75 mm.) diameter, the test shall be made upon the unturned rod. For Rods above 1¼ inches (31·75 mm.) diameter, the rod may be turned down, when either Standard Test Pieces **D** or **E** (*see* Appendix, pages 21 and 22) shall be used, in which case the elongation shall be not less than 45 per cent.

Bend Test.

6. The Rod shall, both when cold and at a red heat, withstand, without machining, being doubled up close without cracking.

Hammering or Crushing Down Test.

7. A piece of Rod 1 inch (25·40 mm.) long shall be placed on end and hammered or crushed down when cold to a thickness of ⅜ inch (9·53 mm.) without showing either crack or flaw on the circumference of the resulting disc.

Additional Tests before Rejection.

8. 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 batch 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 Rods represented by the test pieces shall be liable to rejection.

Inspection.

9. The representative of the Engineer (or of 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 Rod 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.

10. 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.

NOTE.—*The Association desires to call attention to the fact that this Specification is intended to include the technical provisons 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 EXTRUDED COPPER RODS FOR LOCOMOTIVE STAY BOLTS, RIVETS ETC.

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 Rods 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 Rods shall be clean, smooth, uniform in diameter and free from surface defects. The character of the material shall be ascertained by nicking and breaking every Rod at both ends. The material shall be free from piping or other defects of every description.

Marking.

3. Each Rod shall be stamped with the Manufacturer's name near one end.

Mechanical Tests.

4. The representative of the Engineer (or of the Purchaser) shall select and test such of the Rods as he may think proper up to two per cent of each diameter of Rod ordered under the contract.

All test pieces shall withstand the following mechanical tests in the annealed condition, but, in the case of Rods ordered annealed, without any further heat treatment.

Tensile Test.

5. The tensile strength shall be not less than 14·50 tons (32,480 lb.) per square inch (23 kg. per mm.^{2}), with an elongation

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