Specifications for Automatic Couplers
Rhodesia Railways

Notes to readers

The source documents for this file were held in the National Railways of Zimbabwe Drawing Office in Bulawayo. They were discovered, in March 1998, while I was helping with searching for a complete set of drawings of the 15th Class locomotives after No. 398 had been purchased by a private group in New Zealand for eventual export to that country.

The original documents were duplicated copies, hence the slightly indistinct type in some places, on quarto size paper. These were photocopied (with permission) on to A4 size paper while in the Drawing Office and the photocopies scanned when we were back in New Zealand.

The scanned files have been lightly "Photoshopped" to remove most of the artefacts resulting from the photocopying and scanning processes and to increase the contrast to make them more readable.

Alan Bailey
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RHODESIA RAILWAYS

SPECIFICATION

FOR

CAST STEEL AUTOMATIC COUPLERS AND COUPLING GEAR.

1. SCOPE.

1.01. This specification covers the material, manfacture, inspection and testing of cast steel automatic couplers, knuckles yokes and allied parts.

2. QUALITY OF MATERIAL.

2.01. The castings are to be supplied strictly in accordance with B.S. 3100 : 1957 and 592 : 1957 Grade B. in so far as material is concerned and to this specification in all other respects.

2.02. The Coupler knuckle pins shall be made from steel conforming to B.S. 970 : 1955 EN. 23 T.

2.03. The castings shall be manfactured from steel produced by one or other of the following processes : Acid or basic electric, acid or basic open hearth, acid Bessemer and on analysis the sulphur and phosphorus content shall not exceed 0.06 per cent.

2.04. The Manufacturer shall furnish the Administration or its representative with Certificates giving the analysis of every cast of metal used in the manufacture of the steel Castings.

3. MANUFACTURE.

3.01. The castings are to be accurately moulded in accordance with the drawings and are required to be free from honeycomb blowholes or any other defects: Sand cores are to be used in all cases.

3.02. The coupler head and shank are to be cast in such a manner so as to prevent piping in the shank.

3.03. Knuckle pin and cotter holes are to be cored and finished true; where coupler tail pins (radial pins) are fitted the tail pin holes are to be machined and bushes fitted as shown on the drawings.

3.04. The coupler shank to be machined or ground as indicated on the drawings.

3.05. Templates and gauges are to be made and the coupler heads, knuckles, yokes etc. are to be clean castings.

3.06. Yokes are to be cast smooth and true to dimensions shown on the drawing.

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3.07. Two test blocks shall be cast with each cast of metal; one shall be located to catch the metal at the early stages of the pour and the other towards the end of the cast. The test blocks may either be cast attached to one of the castings or cast separately.

4. MARKING.

4.01. The castings must be marked with cast in raised letters, or stamped where the former is not practicable, on part of the casting which is not to be machined, with the supplier's trade name, mark or initials, the year of manufacture and the cast number of each batch. Stamping should be done at the same place on all couplers. Firms should state when tendering what marking they propose to employ.

5. ANNEALING.

5.01. Before annealing all castings must be sufficiently cleaned of adhering sand to ensure thorough and uniform heating.

5.02. All castings, together with the test pieces are to be thoroughly annealed in a suitable furnace which is controlled by a recording pyrometer. The Manufacturer shall produce the pyrometer charts for any or all the batches of casting when called upon to do so. All such charts shall show the cast or casts represented by the annealing and all such information must be placed on the charts before the annealing process is commenced.

5.03. The castings must be heated slowly and uniformly to temperatures varying with the carbon content of the steel approximately as follows.

CARBON.	TEMPERATURE °C.
Up to 0.16 per cent	925
From 0.16 to 0.34 per cent	870
From 0.35 to 0.54 per cent	850

5.04. The castings with test pieces attached, or the separate test blocks, shall be placed in the annealing furnace in such a position that they will truly represent the average of the temperatures obtained during annealing.

5.05. The castings must be kept at maximum temperature for a sufficient length of time to ensure refining of the grain structure. They must be cooled in the furnace or in a bed of material that is a poor conductor of heat, at the lowest rate which will give the tensile strength and elongation specified and also so that the stresses set up by the unequal rates of cooling are rectified.

5.06. Where the castings are cooled in the furnace and seeing that they are generally of uneven section, the furnace must be closed after they have reached a black heat, and their further cooling retarded so that the stresses set up by the unequal rates of cooling are rectified.

6. REPAIRS TO DEFECTIVE CASTINGS.

6.01. Any defects or unsound metal which a casting may have, from whatever cause arising, shall be left bare, and no filling with the object of obliterating such defects will be permitted unless previously sanctioned by the Administration or its representative. Any casting upon which such work has been done without sanction having been obtained will be rejected.

6.02. All repairs by welding shall be carried out in accordance with Appendix A of B.S. 3100 : 1957.

7. TESTING AND GAUGING.

7.01. At least one tensile and one cold bend test shall be taken from each cast and 2 per cent of the castings shall be selected from the bulk to be tested to destruction.

7.02. The tensile test pieces are to have a cross-sectional area of ½ square inch (0.798 inch diameter) and are to conform to the sizes in Table 1 of B.S. 18 : 1956. The tensile test pieces are to withstand the mechanical properties laid down in B.S. 3100 : 1957 and 592 : 1957, for Grade B. castings.

7.03. The cold-bend tests shall be made upon machined tested pieces having either a diameter of 1 inch or a rectangular section of 1 inch x ¾ inch. In the case of the rectangular test pieces the edges shall be machined or draw-filed to a radius of 1/16 inch and the tests shall be made by bending the test pieces over the inch section.

7.04. The cold bend test pieces shall, without fracture, withstand being bent cold round a former having a radius of 1 inch through an angle of 90 degrees.

7.05. Each casting selected for destruction shall be tested under a tup or power hammer and shall show considerable deformation before fracturing. The fracture shall be free from flaws and the grain shall show that the casting has been annealed in a satisfactory manner.

7.06. The Manufacturer shall furnish the Administration or its representative with a test certificate showing the mechanical properties for the castings produced from each cast.

7.07. Should any testpiece fail the specified test and the fractured testpiece indicate, in the opinion of the Inspector, that the result does not fairly represent the bulk of the material submitted, two more testpieces shall be taken from the same batch of material from which the unsatisfactory testpiece was selected for repeating the test under which the failure occurred.

Any material which has been re-tested in this manner shall be accepted if the results of all the testpieces re-tested, are satisfactory. Should any one or more of the re-tests fail, however, the material represented by such tests shall be rejected.

8. TESTING FACILITIES.

8.01. The Manufacturer shall supply the castings 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 making all tests on his premises in accordance with this specification. If facilities for making the prescribed tests are not available at his own works, the Manufacturer shall carry out the tests elsewhere.

9. INSPECTION.

9.01. The Administration or its representative shall have free access to the works of the Manufacturer at all reasonable times during the course of the manufacture of the castings. He shall be at liberty to inspect the manufacture at any stage and to reject any castings or material that is unsound or does not otherwise conform to the terms of this specification.

CHIEF MECHANICAL ENGINEER.
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