

Specification for Staybolt Steel Rhodesia Railways

Notes to readers

The source document for this file was the Office Copy of the specification held in the National Railways of Zimbabwe Drawing Office in Bulawayo. It was 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 document was a duplicated copy hence the slightly indistinct type in some places. This was 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 file has been lightly “Photoshopped” to remove most of the artefacts resulting from the photocopying and scanning processes and to increase the contrast to make it more readable.

Any alterations, amendments or corrections done by hand have all been left in place and this file is a reasonably accurate reproduction of the original.

Alan Bailey
December 2010

RHODESIA RAILWAYS - MECHANICAL DEPARTMENT.

SPECIFICATION FOR STAYBOLT STEEL

S. A. R. SPEC. NO. CME. 92/1940.

Only brands which have been tested and approved by the Administration shall be accepted, provided suppliers comply strictly with the following requirements: -

1. Quality.

The steel shall be made by the Open Hearth process and the analysis shall conform as follows: -

Carbon	...	0.20% Max.
Silicon	...	0.30% "
Manganese	...	1.00% "
Sulphur	...	0.05% "
Phosphorus	...	0.05% "
Nickel	...	3.00% " (Optional).

A certified copy of the analysis of each cast shall be furnished.

2. Physical Properties.

A test piece prepared as described in Clause 3(b) shall give results in conformity with the following: -

(a) Tensile Test

Ultimate tensile strength	...	24 to 32 tons per sq.in. (2,240 lb.)
Yield Point	...	60% of maximum stress obtained.
Elongation	...	28% minimum.
Reduction of Area	...	60% minimum on solid bars.

(b) Notch Bend Test - The prepared test piece shall be bent through 180° over a radius not exceeding 2D (when D = diameter of test piece) and show a fibrous structure on fracture.

(c) Izod Impact Test - 60 foot pounds minimum.

3. Testing.

(a) Selection - One tensile, one notched bend and one impact test shall be considered as a set of tests. Two sets per cast per 6 tons of material. Should a cast be submitted rolled into different sections, then each change of section shall provide a further set of tests taken concurrently.

The inspector shall select bars from the lot submitted as indicated above, and these test bars shall be of sufficient length for the requirements of a set of tests. The selected test bars shall receive no further heat treatment whatsoever.

The bars from which the test bars have been cut may be included for shipment with the bulk as submitted for testing.

(b) Preparation of Test Pieces - All test pieces shall be machined longitudinally from the centre portion of the test bars selected under 3(a) representative of the section being tested.

(i) Tensile Test Piece - The test piece shall be machined cold to the dimension as shown in B.S.S. No.18/1938, test piece C.

- (ii) Notch Bend Test Piece - The test pieces shall be cut one third through with a hacksaw. Reduction of an "as rolled" bar, if considered necessary, is to be done by cold machining to the size required.
- (iii) Izod Impact Test Piece - The test piece shall be machined in accordance with B.S.S. No. 131/1933, Figure 5 (3 notches) or Figure 20.

4. Finish and Tolerance Limits.

- (a) Finish -- All bars shall be accurately rolled and reeled to the specified diameter, and within the tolerance limits given below.

The bars shall be round, of uniform section throughout their length, and straight. Bars may be supplied either hot or cold sawn to specified length, with a tolerance of plus or minus 12".

The bars shall be free from cracks, surface flaws, laminations and all other defects and shall be of best mill finish throughout.

(b) Tolerance in diameter	Variation in Size	
	Under	Over
Up to and including 1½" dia.	Nil	Up to 0.015"
Over 1½" dia. up to and including 1¾" dia.	Nil	Up to 0.020"
Over 1¾" dia. up to and including 2½" dia.	Nil	Up to 0.025"

- (c) Hexagon bars, flat bars and billets are subject to tolerances in accordance with usual mill practice, or as may be specially indicated when ordering.

C.M.E.'s Office,
RHODESIA RAILWAYS,
BULAWAYO.

26th February, 1957.