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REPORT

ISSUED BY

The Engineering Standards Committee.

SUPPORTED 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 AND SECTIONS BULL HEADED RAILWAY RAILS.

LESLIE S. ROBERTSON, M.Inst.C.E.,

Secretary.

LONDON:

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7, STATIONERS' HALL COURT, LUDGATE HILL, E.C.

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28, VICTORIA STREET, WESTMINSTER, S.W.

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PREFACE.

The Committee on Rails was appointed at a Meeting of the Main Committee on July 16th, 1901.

At the first meeting of the Rails Committee, held on October 31st, 1901, two Sub-Committees were appointed.

1. A Sub-Committee on Tramway Rails, under the Chairmanship of Mr. W. Howard Smith, the Report of which was approved by the Main Committee on July 13th, 1903, and has already been published.
2. A Sub-Committee on Railway Rails, under the Chairmanship of Mr. James C. Inglis, of the Great Western Railway. To this latter Sub-Committee fell the duty of drafting the Specification and Sections forming the subject of this Report.

At the commencement of their labours the Sub-Committee, through the courtesy of the principal Railways of the United Kingdom, were enabled to obtain particulars showing the trend of modern practice with regard to the sections of Bull Headed Rails then in use. From these data several series of drawings of the sections were prepared and circulated to the Chief Engineers of the principal Railways of Great Britain and Ireland, and as a result the present Standards were arrived at.

A similar course was adopted with regard to the draft Specification for Bull Headed Rails, which was also submitted to the Chief Engineers of the principal British and Irish Railways, through the Railway Engineers' Association, and to a meeting of the leading Rail Makers.

The thanks of the Committee are due to the Members of the Railway Engineers' Association for their co-operation, and in particular to Mr. James C. Inglis for the preparation of the various series of Standard Bull Headed Rails.

This Report was approved by the Main Committee at their Meeting on July 26th, 1904.

3 *Review*

ENGINEERING STANDARDS COMMITTEE.

The following are lists of Members of the Committee on Rails, and of the Sub-Committee who were entrusted with the drafting of the Standard Specification and Sections of Bull Headed Railway Rails.

COMMITTEE ON RAILS.

Sir JOHN WOLFE BARRY, K.C.B., *Chairman.*

F. R. UPCOTT, Esq., C.S.I.	Representing the India Office.
<i>W. L. H.</i> Sir W. SHELFORD, K.C.M.G.	Representing the Crown Agents for the Colonies.
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<i>Sir</i> Dr. A. B. W. KENNEDY.	
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W. HOWARD SMITH, Esq.	
E. B. THORNHILL, Esq. (L. & N. W. R.)	
J. M. WHILE, Esq. (<i>to narrow steam-tube & test & Co.</i>)	

ENGINEERING STANDARDS COMMITTEE.

SUB-COMMITTEE ON RAILWAY RAILS

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F. R. UPCOTT, Esq., C.S.I. Representing the India Office.
G. L. EYLES, Esq., C.M.G. Representing the Crown Agents for
the Colonies.
J. WILSON, Esq. (G. E. R.) } Nominated by the Railway En-
W. B. WORTHINGTON, Esq. (L. & Y. R.) } gineers' Association.
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W. EVANS, Esq. *(First Deputy Chairman)*
BRODIE HENDERSON, Esq.
E. WINDSOB RICHARDS, Esq.
A. ROSS, Esq. (G. N. R.)
E. B. THORNHILL, Esq. (L. & N. W. R.)
J. M. WHILE, Esq. *(Secretary)*

Mr A. Ross
GREAT NORTHERN RAILWAY.
April 4th., 1907.

Dear Sir,
re Annual Meeting of Sectional Committees.
I have considered your circular letter of the 19th, instant.

I think there is a strong feeling among Railway Engineers that the rails we are getting nowadays are not of so good and lasting qualities as formerly, and it seems to me that the question of chemical analysis may require revision. (Report No. 9).

Yours faithfully,
(Sgd.) A. ROSS.

Mr E. B. Thornhill
LONDON & NORTH WESTERN RAILWAY.
April 11th., 1907.

Dear Sir,
Engineering Standards Committee.
(Annual Meeting of Sectional Committees).

In reply to your letter of the 19th. ult.

The only suggestion I have to make is that in the Specification for Bull-headed Steel Rails, (Report No. 9), the limits for the carbon analysis which are now given "from 0.35 to 0.50" per cent. should be altered to "From 0.40 to 0.50". In my opinion the range is unnecessarily large, and 0.35 is too low for good wearing rails.

Yours faithfully,
(Sgd.) E. B. THORNHILL.

LESLIE S. ROBERTSON, Esq.

Note:—The Committee desire to call attention to the fact that this Specification contains the main technical provisions relating to the approved Standard referred to therein, but does not purport to include all the necessary provisions of a Contract.

BRITISH STANDARD SPECIFICATION

AND
SECTIONS
OF

BULL HEADED RAILWAY RAILS.

1. The steel for the Rails shall be of the best quality made by the Bessemer, Siemens-Martin or other process, to be approved by the Engineer (or by the Purchaser).

The Rails shall show on analysis that in chemical composition they conform to the following limits:—

Carbon	... from	... 0.35 to 0.5	per cent.
Manganese	" "	" 7 to 1.0	" "
Silicon	... not to exceed	" 0.1	" "
Phosphorus	" "	" 0.075	" "
Sulphur	" "	" 0.08	" "

2. The Manufacturer shall make and furnish to the representative of the Engineer (or of the Purchaser) carbon determinations of each cast.

A complete chemical analysis, representing the average of the other elements contained in the steel, shall be similarly given for each rolling. Such complete analysis shall be made from drillings taken from the rail or tensile test piece or pieces. When the rolling exceeds 200 tons, an additional complete analysis shall be made for each 200 tons or part thereof.

Should the Engineer desire to make independent chemical determinations, the necessary specimens and samples shall be furnished by the Manufacturer. For this purpose not more than two rails in every hundred manufactured shall be selected by the Engineer and drillings taken from the head of the rail, unless otherwise specified by him, and if, upon

Chemical Composition

see opposite

Mr Matheson

The only modification that I can suggest in the Specification is that the words "All straightening shall be done by pressure, and not by hammering" should be added to the end of the paragraph dealing with "Manufacture". (Specification for Bull Headed Rails, Report No.9, Clause 3).

Yours faithfully,

(Sgd.) DONALD A. MATHESON.

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Clause 4 - Mr Worthington says:-

"Hope Committee will adhere to the one per cent. margin, it has been found sufficient on this railway"

being subjected to the specified tests, either fail to comply therewith, then all the Rails in the blow of which the test pieces form a part may be rejected.

In case of difference between the Engineer (or between the Purchaser) and the Manufacturer as to the accuracy of an analysis, either party shall have the right to have samples of the steel analysed by an independent metallurgist, to be mutually agreed upon. The expenses attendant upon such independent analysis shall be borne by the party adjudged to be in the wrong.

3. Each Rail shall be made from an ingot not less than 12 inches square at the smaller and 14 inches square at the larger end, and must be clogged down into blooms, and sufficient crop then sheared from each end to ensure soundness. *See opposite*

4. A rolling margin of $\frac{1}{2}$ per cent under to $\frac{1}{4}$ per cent above the specified weight will be permitted, but the contract weight only will be paid for. *See Permissible Variation in Weight. See also Cudworth's Letter C.L.*

5. TABLE OF GENERAL DIMENSIONS OF "B.S." RAILS.

No. of "B.S." Section.	Height of Rail.		Width of Head.		Nominal Weight of Rail.	
	Inches.		Inches.		Lbs. per Yard.	
60	$4\frac{3}{4}$	$4\frac{3}{4}$	$2\frac{5}{8}$	$2\frac{5}{8}$	60	
65	$4\frac{7}{8}$	$4\frac{7}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	65	
70	5	5	$2\frac{7}{8}$	$2\frac{7}{8}$	70	
75	$5\frac{1}{8}$	$5\frac{1}{8}$	$2\frac{1}{2}$	$2\frac{1}{2}$	75	
80	$5\frac{3}{8}$	$5\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	80	
85	$5\frac{1}{2}$	$5\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{4}$	85	
90	$5\frac{5}{8}$	$5\frac{5}{8}$	$2\frac{3}{8}$	$2\frac{3}{8}$	90	
95	$5\frac{3}{4}$	$5\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	95	
100	$5\frac{7}{8}$	$5\frac{7}{8}$	$2\frac{3}{4}$	$2\frac{3}{4}$	100	

General Dimensions of Rails. *See also Worthington*

6. Before the general manufacture of the Rails is commenced the Templates. Manufacturer shall, if required by the Engineer (or by the Purchaser), supply two sets of templates, internal and external, of approved material, for each "B.S." Section of Rail.

Each template shall be suitably engraved with the Purchaser's name, the number of the "B.S." section (being the nominal weight of the Rail in lbs. per lineal yard), the Manufacturer's name and address, and the date of the Contract.

These templates shall be submitted to the Engineer (or to the Purchaser) for his approval, and at the commencement of rolling the Engineer will have a competent person present to approve of the section.