

Specification for

Railway turnouts for private users —

Part 1: Turnouts over which British
Railways locomotives operate —

Section 1.2: Turnouts using flat bottom
rail

Confirmed March 2010

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standards was prepared, consists of representatives from the following Government departments and scientific and industrial organisations:

Associated Offices' Technical Committee	Gas Council
Association of Consulting Engineers*	Institution of Civil Engineers
Association of Mining Electrical and Mechanical Engineers	Institution of Gas Engineers
British Chemical Plant Manufacturers' Association	Institution of Heating and Ventilating Engineers
British Compressed Air Society	Institution of Mechanical Engineers
British Electrical and Allied Manufacturers' Association	Institution of Mechanical Engineers (Automobile Division)
British Gear Manufacturers' Association	Institution of Production Engineers
British Internal Combustion Engine Manufacturers' Association	Locomotive and Allied Manufacturers' Association of Great Britain
British Steel Industry*	London Transport Executive
British Mechanical Engineering Confederation	Machine Tool Trades Association
Crown Agents for Oversea Governments and Administrations	Ministry of Defence, Army Department
Department of the Environment	Ministry of Defence
Department of Employment and Productivity	Department of Trade and Industry — National Engineering Laboratory
Department of Trade and Industry	National Physical Laboratory (Department of Trade and Industry)
Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales*	National Coal Board*
Engineering Equipment Users' Association	Royal Institute of British Architects
	Water-tube Boilermakers' Association

The scientific and industrial organizations marked with an asterisk in the above list together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

British Bolt, Nut, Screw and Rivet Federation	British Railways Board
Industrial firms	

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee, was published under the authority of the Executive Board on 12 May 1971

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¹⁾ Figure may be obtained in an enlarged form by application to the British Standards Institution.

Foreword

This standard makes reference to the following British Standards:

BS 9, *Bull head railway rails.*

BS 11, *Flat bottom railway rails.*

BS 24, *Railway rolling stock material — Part 3A: Laminated springs and spring steel — Part 6: Steel slabs, plates, sections, bars and rivets for locomotive boilers, locomotives, carriages and wagons.*

BS 47, *Steel fishplates for bull head and flat bottom railway rails.*

BS 64, *Steel fishbolts and nuts for railway rails.*

BS 84, *Parallel screw threads of Whitworth form.*

BS 729, *Zinc coatings on iron and steel articles.*

BS 729-1, *Hot-dip galvanized coatings.*

BS 913, *Pressure creosoting of timber.*

BS 970, *Wrought steels in the form of blooms, billets, bars and forgings — Part 1:*²⁾ *Carbon and carbon manganese steels, including free cutting steels — Part 6:*²⁾ *Carbon and alloy spring steels for the manufacture of hot formed springs.*

BS 1452, *Grey iron castings.*

BS 1802, *Steel spring washers for general engineering and automobile purposes.*

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee.

This standard relates exclusively to turnouts produced from new rails complying with BS 11. It is recognized that second quality and partly worn rails are used for the manufacture of turnouts, but it should be clearly understood that their use is subject to agreement between the purchaser and the supplier. The recommended minimum acceptance requirements for partly worn rails are given in Appendix A. Turnouts from curved track have been omitted from this standard as they would complicate the tables and diagrams, but when they are used, the minimum radius should be maintained, although the crossing angles obtained may be outside the range shown.

Special requirements such as insulation for track-circuiting have not been included.

Nomenclature is given in Table 1 with cross references to layout and component diagrams for identification of parts or standard turnouts.

Materials and dimensions are specified.

The size of page adopted for this standard results in the detail in some of the figures being rather small for convenience of reading. Figure 11, Figure 12, Figure 15, Figure 16, Figure 18 and Figure 19 may be obtained in a larger form by application to the British Standards Institution.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 23 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

²⁾ In the course of preparation.

1 Scope

This Section 1.2 of this British Standard specifies requirements for turnouts over which British Railways locomotives operate from straight track 4 ft 8½ in gauge manufactured from new flat bottom rails to BS 11-110A.

The angles of crossing are 1 in 7½, 1 in 8, 1 in 9, 1 in 10, 1 in 11, 1 in 12.

NOTE The titles of the British Standards referred to in this standard are listed on page ii.

2 Definitions

For the purposes of this Section of this British Standard the following definitions apply:

railway turnout

a complete unit consisting of curved track diverging from straight track as illustrated in the layout diagrams of this standard

hand of turnout

the direction in which the curved track leaves the straight track

3 Inspection

The purchaser or his representative shall have access at all reasonable times to those parts of the works engaged on the contract or order. He shall be at liberty to witness the manufacture at any stage.

4 Identification marking

Each complete turnout shall be marked by stamping with 1 inch letters and figures on the web of the wing rails at the check ends with the number of this British Standard, i.e. 4521-1.2.

When rail components are supplied separately they shall be stamped on the end of the rail with the number of this British Standard and item number as shown in the nomenclature tables.

All chairs, baseplates and blocks shall be marked with identification letters, rail section, the manufacturer's initials and the month and year of manufacture.

5 Design and production

The design of turnouts is based on the British Railways standard for non-insulated track.

The minimum rail curvature shall be 518 ft. radius measured to the running edge of the outer curved rail.

The switches shall be straight cut with joggled stock rails operated by a spring-type lever box, unless remotely controlled.

The shaping of the rails shall be carried out by machining, sawing and pressing. The holes shall be drilled.

The turnouts shall be supported on timbers 12 inches by 6 inches in cross section.

Bolts shall be threaded BSF (BS 84) except where otherwise stated.

6 Nomenclature

The nomenclature and numerical reference numbers for components is given in Table 1 which refers to item numbers used for identification in Figure 1 to Figure 20.

Component details are given in Figure 6 to Figure 20 as a further aid to identification.

7 Materials

Materials shall be in accordance with the requirements shown in Table 2.

8 Dimensions

The leading dimensions shall be in accordance with those shown in Figure 1, Figure 2, Figure 3 and Figure 5, and in Table 3 and Table 4.

The rail shall comply with the requirements specified in BS 11 rail section 110A.

The fishplates, fishbolts and nuts shall comply with the requirements specified in BS 47.

Appendix A Partly worn rail

Partly worn flat bottom rail used for the construction of turnouts should have a minimum depth, measured on the vertical axis, of $5\frac{15}{16}$ in. or a minimum weight of 100 lb/yd.

It should be free from excessive side wear, chair gall and corrosion.

As a guide to the purchaser it is recommended that flat bottom rail should be renewed when the depth reaches 5 % in. The precise figure will depend on the following conditions:

- condition of sleepers and timbers;
- spacing of sleepers and timbers;
- condition of ballast;
- presence of side cutting.

Table 1 — Nomenclature for components

Item No.	Description	Figure No.	Item No.	Description	Figure No.
101	Stock rail, left hand and right hand	Figure 1, Figure 4	133	Second stretcher bar	Figure 1, Figure 4, Figure 14
102	Switch tongue rail, left hand and right hand	Figure 1, Figure 4	34	Connecting rod (adjustable)	Figure 1, Figure 4, Figure 11
103	Straight running rail	Figure 1, Figure 4	37	Timbers	Figure 1, Figure 4
104	Straight closure rail	Figure 1, Figure 4	38	Coach screw or fang bolt	Figure 4, Figure 7
105	Curved running rail	Figure 1, Figure 4	39	Ferrule	Figure 7
106	Curved closure rail	Figure 1, Figure 4	141	Switch and crossing bolts	Figure 20
107	Rail joint, fishplated	Figure 1, Figure 4, Figure 6			
108	Wing rail, right hand	Figure 1, Figure 4	42	Lever box (spring-operated)	Figure 1, Figure 4
109	Wing rail, left hand	Figure 1, Figure 4			
110	Check rail	Figure 1, Figure 4, Figure 17			
111	Point rail	Figure 1, Figure 4	143	Switches "B" Straight only	Figure 11
112	Splice rail	Figure 1, Figure 4	144	Crossing 1 in $7\frac{1}{2}$	Figure 15
			145	Crossing 1 in 8	Figure 15
116	Fishplate	Figure 6	146	Crossing 1 in 9	Figure 15
120	ST baseplate	Figure 1, Figure 4, Figure 9	147	Crossing 1 in 10	Figure 15
121	Switch slide baseplates	Figure 1, Figure 4, Figure 12	148	Switches "C" Straight cut	Figure 11
122	Switch heel baseplate	Figure 1, Figure 4, Figure 12	149	Crossing 1 in 11	Figure 16
123	L baseplate	Figure 1, Figure 4, Figure 10	150	Crossing 1 in 12	Figure 16
25	Check baseplate	Figure 1, Figure 4, Figure 17			
26	Crossing baseplates	Figure 1, Figure 4, Figure 18	170	Soleplate	Figure 1, Figure 4, Figure 14
			172	Universal washers (main and auxiliary)	Figure 8
29	Switch heel blocks	Figure 1, Figure 4, Figure 12	73	Spring washers	Figure 14, Figure 20
30	Crossing blocks	Figure 1, Figure 4, Figure 19	174	Stock rail washer	Figure 13
31	Check block	Figure 1, Figure 4, Figure 17			
35	Distance blocks (switches)	Figure 1, Figure 4, Figure 13	180	Spring clip	Figure 4, Figure 8
			181	Tee bolt and nut	Figure 8
32	First stretcher bar	Figure 1, Figure 4, Figure 14	182	Fishbolt, nut and washer	Figure 6

NOTE Item numbers not in the 100 series are common to other parts of this standard.

Table 2 — Materials for components

Part	Material
Rails	BS 11
Stretcher bars	BS 24-3A:Grade 8
Stretcher bar brackets	BS 24-6:Grade 621
Connecting rod (adjustable)	BS 24-6:Grade 621
Soleplate	BS 24-6:Grade 621
Base plates	BS 1452:Grade 12
Tee bolts and nuts	BS 64 (quality only)
Spring clips	BS 970-5, steel 250 A53
Coach screws	BS 970-1, steel 080 M40 (galvanized to BS 729-1)
Ferrules	Hardwood or approved plastics material
Fang bolts and shoes	BS 64
Crossing, switch and check blocks and main washers	BS 1452:Grade 12
Auxiliary and stock rail washer	BS 24-6:Grade 621
Fishplates	BS 47:Class B
Fishbolts and nuts	BS 64
Switch and crossing bolts and nuts	BS 64
Spring washers	BS 1802
Timbers	Douglas fir or equivalent (incised and creosoted to BS 913)

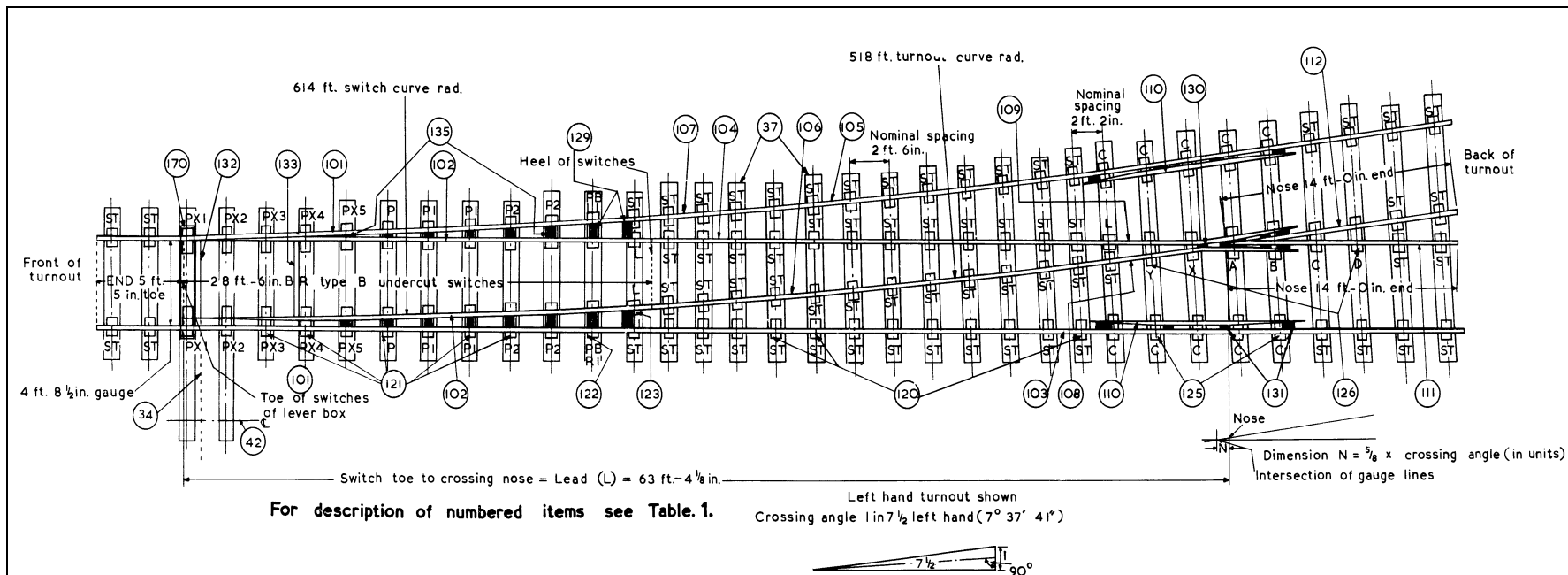


Figure 1 — Layout diagram for turnouts (1 in 7½ L.H. turnout shown)
BS 11-110A flat bottom rail

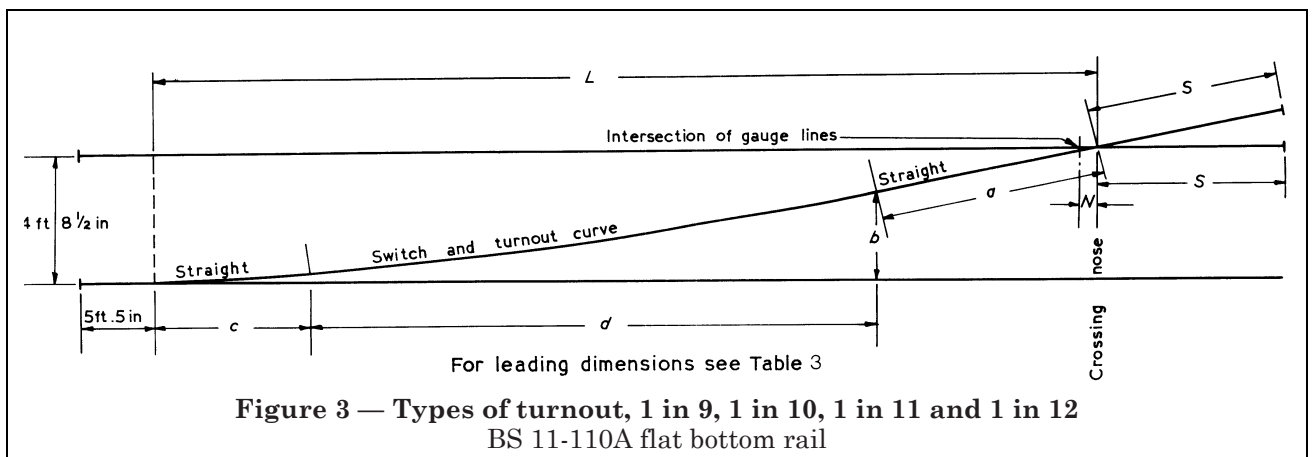
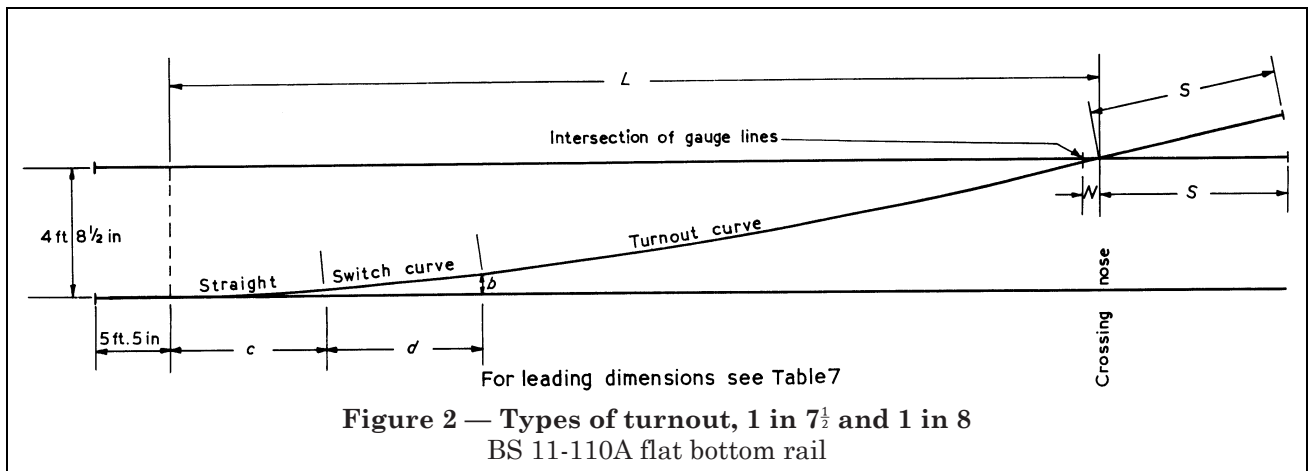


Table 3 — Leading dimensions of turnouts in Figure 2 & Figure 3

Type of switch	Switch curve radius	Length of switch rail	Angle of crossing	Switch toe to crossing nose	Turnout radius	Dimensions				Crossing nose to end of vee	Crossing nose to intersection point	Type of turnout
				<u>L</u>		<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>			
B	ft 614	ft in 28 – 6	1 in $7\frac{1}{2}$	ft in $63 - 4\frac{7}{8}$	ft 518	ft in NIL	ft in $1 - 1\frac{7}{8}$	ft in 7 – 4	ft in 19 – 8	ft in 14 – 0	in $4\frac{11}{16}$	Fig. No. Figure 25
			1 in 8	$65 - 0\frac{3}{8}$			ft in $1 - 1\frac{7}{8}$		19 – 8		5	
			1 in 9	$65 - 7\frac{3}{8}$	614	9 – 6	$3 - 8\frac{1}{2}$		48 – 10		$5\frac{5}{8}$	Figure 26
			1 in 10	$67 - 0\frac{1}{2}$		$17 - 8\frac{3}{4}$	$4 - 11\frac{7}{8}$		$42 - 0\frac{7}{8}$		$6\frac{1}{4}$	
C	958	28 – 6	1 in 11	$81 - 9\frac{1}{2}$	958	$9 - 8\frac{3}{8}$	$3 - 10\frac{5}{8}$	9 – 2	$62 - 11\frac{5}{8}$	16 – 6	$6\frac{7}{8}$	Figure 26
			1 in 12	$83 - 0\frac{1}{8}$							$18 - 1\frac{3}{4}$	