

Specification for

Dimensions of track circuit insulation

Co-operating organizations

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

Admiralty	Electricity Council, Generating Board and the
Air Ministry	Area Boards in England and Wales
Associated Offices' Technical Committee	Electronic Engineering Association
Association of Consulting Engineers	Engineering Equipment Users' Association
(Incorporated)*	Independent Cable Makers' Association
Association of Supervising Electrical Engineers	Institution of Electrical Engineers*
British Electrical and Allied Industries	Ministry of Aviation
Research Association	Ministry of Labour (Factory Inspectorate)
British Electrical and Allied Manufacturers'	Ministry of Power
Association*	Ministry of Works
British Electrical Development Association	Municipal Passenger Transport Association
British Railways, The British Transport	(Incorporated)
Commission*	National Inspection Council for Electrical
Cable Makers' Association	Installation Contracting
Crown Agents for Oversea Governments and	National Physical Laboratory (D.S.I.R.)
Administrations*	Oil Companies Materials Association
Electric Lamp Industry Council	Post Office
Electric Light Fittings Association	Public Transport Association (Incorporated)
Electrical Contractors' Association	South of Scotland Electricity Board
(Incorporated)	War Office
Electrical Contractors' Association of Scotland	

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 standard:

British Transport Commission	Ministry of Transport
Federation of British Industries	National Union of Manufacturers
London Transport Executive, the British	Manufacturers of insulating material
Transport Commission	

This British Standard, having been approved by the Electrical Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 30 August 1961

© BSI 11-1999

First published August 1932
First revision August 1961

The following BSI references relate to the work on this standard:
Committee reference ELE/22 and ELE/22/9
Draft for comment CY(ELE) 3127

ISBN 0 580 00785 5

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Co-operating organizations	Inside front cover
Foreword	iii
1 Scope	1
2 Definitions	1
3 Material	1
4 Joint insulations for running rail	2
5 Sets of insulations for running rail joints	2
6 Joint insulations for combined running and check rails	2
7 Sets of insulations for combined running and check rail joints	3
8 Sole plate and stretcher bar insulations	3
9 Connecting rod insulations	3
10 Sets of insulations for sole plates, stretcher bars and connecting rods	3
11 Tolerances on dimensions	4
Appendix A Information to be supplied with enquiry and order	11
Appendix B Information on rail insulations for superseded rail sections	11
Appendix C Guidance on how to minimize the accumulation of metallic dust	16
Appendix D Table of approximate metric equivalents	17
Figure 1 — Typical arrangements of channel type insulation for single rail	18
Figure 2 — Typical arrangements of solid fishplate type insulation for single rail	18
Figure 3 — Typical channel type insulation for combined bullhead running and check rails	19
Figure 4 — Typical channel type insulation for combined flat bottom running and check rails	20
Figure 5 — Typical solid insulating fishplates for bullhead running and check rails	21
Figure 6 — Typical solid insulating fishplates for flat bottom running and check rails	22
Figure 7 — Typical arrangement of sole plate insulated joint	23
Figure 8 — Typical arrangement of stretcher bar insulated joint	23
Figure 9 — Section through channel insulation	24
Figure 10 — Side plate for 2-channel insulation	24
Figure 11 — Side-plate for 4-channel insulation	24
Figure 12 — End post for 2-channel side plate insulation	25
Figure 13 — End post for 4-channel side plate insulation	25
Figure 14 — Bush	25
Figure 15 — Solid insulating fishplate for bullhead rails	26
Figure 16	27
Figure 16A	27
Figure 17 — Side plate for 2-channel insulation	27
Figure 18 — Side plates for 4-channel insulation	27
Figure 19 — End post for 2-channel side plate insulation	28
Figure 20 — End post for 4-channel side plate insulation	28
Figure 21 — Bush	28
Figure 22 — Solid insulating fishplate for flat bottom rails	29

	Page
Figure 23 — Centre insulating plate for sole plate	30
Figure 24 — Side insulating plate for sole plate	30
Figure 25 — Centre insulating plate for permanent way stretcher bar	30
Figure 26 — Side insulating plate for permanent way stretcher bar	30
Figure 27 — Centre insulating plate	31
Figure 28 — Side insulating plate	31
Figure 29 — Bush	31
Figure 30 — Plate	32
Figure 31 — Bush	32
Figure 32 — Washer	32
Figure 33 — Typical arrangement of end post to minimize the accumulation of metallic dust	33
Figure 34 — End posts for 2-channel side plate insulation	34
Figure 35 — End posts for 4-channel side plate insulations	35
Table 1 — Sets of insulations for running rail joints	2
Table 2 — Sets of insulations for combined running and check rail joints	3
Table 3	3
Table 4 — Dimensions of end post for bullhead rails 2-channel-side plate type insulation (Figure 12)	4
Table 5 — Dimensions of end post for bullhead rails 4-channel side plate type insulation (Figure 13)	4
Table 6 — Dimensions of side plate type rail-joint insulations for flat bottom rails (Figure 16A, Figure 17 and Figure 18)	5
Table 7 — Dimensions of end post for flat bottom rails 2-channel type insulation (Figure 19)	6
Table 8 — Dimensions of end post for flat bottom rails 4-channel type insulation (Figure 20)	7
Table 9 — Dimensions of bush for flat bottom rails (Figure 21)	8
Table 10 — Dimensions of solid insulating fishplate for flat bottom rails (Figure 22)	9
Table 11 — Insulating plates for sole plates (Figure 23 and Figure 24)	10
Table 12 — Insulations for connecting rods	10
Table 13 — Dimensions of side plate for flat bottom rails	12
Table 14 — Dimensions of solid insulating fishplate for flat bottom rails (Figure 22)	14
Table 15 — Dimensions of end post for flat bottom rails 2-channel side plate type insulation (Figure 34)	15
Table 16 — Dimensions of end post for flat bottom rails 4-channel type insulation (Figure 35)	16

Foreword

This standard makes reference to the following British Standards:

BS 9, *Bull head railway rails.*

BS 11, *Flat bottom railway rails.*

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

BS 216, *Vulcanized fibre sheet for electrical purposes.*

BS 934, *Vulcanized fibre (natural colour) rods and tubes for electrical purposes.*

BS 1322, *Aminoplastic moulding materials.*

BS 2572, *Phenolic laminated sheet.*

BS 2966, *Phenolic resin-bonded cotton fabric sheets for electrical purposes.*

In revising the 1932 edition of this British Standard, account has been taken of present trends and practices in the Industry, and consequently certain features contained in the earlier edition have been deleted and later practices have been introduced.

Requirements for angle side plates have been omitted as current practice is not to use this type of insulation. Dimensions for six-hole fishplates have not been included as they can be deduced from the dimensions for the four-hole fishplates. References to strain insulators and insulations for air-pipes and cable ducts which were in the previous edition have been deleted as they do not constitute an essential part of the standard.

The standard now covers insulations for all rail sections above 85 lb per yard bullhead and 70 lb per yard flat bottom as specified in the appropriate British Standard. Rail insulations have not necessarily been manufactured as standard equipment for the rail section listed in the standard, but opportunity has been taken in preparing this specification to lay down appropriate dimensions corresponding to all rail sections in common use. The lighter rail sections are not included as insulations for these are not in common use. The specification now includes solid insulating fishplates. Synthetic resin bonded fabric has been listed as suitable insulating material in addition to vulcanized fibre which was mentioned in the previous edition.

Appendices to the standard give information to be supplied with enquiry and order, and also information on insulations for superseded rail sections to assist when replacements are required. There is also an appendix which gives modifications to end posts in order to reduce the effects of metallic dust.

NOTE Where metric equivalents are stated the figures in British units are to be regarded as standard; the metric conversions are approximate. Appendix D gives metric conversions for units used in the tables and drawings. More accurate conversions should be based on the tables in BS 350, "Conversion factors and tables".

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 to iv, pages 1 to 36, an inside back cover 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.

1 Scope

This British Standard covers dimensions for rail-joint insulations, based on the accepted use in industry of certain materials, for the following rail sections:

Bullhead rails. Sections 85R, 90R, 95R and 100R lb per yard rails as shown in BS 9, “*Bull head railway rails*”.

Flat bottom rails. Sections 70A, 75A, 80A, 85A, 90A, 95A, 100A, 105A and 110A lb per yard rails as shown in BS 11, “*Flat bottom railway rails*”.

Insulations for sole plates, stretcher bars and rod joints are also given.

NOTE See Appendix B for dimensions of insulation for superseded rails.

2 Definitions

For the purpose of this standard the following definitions apply:

2.1

metal fishplate

a steel fishplate complying with BS 47¹⁾ except in so far as its dimensions have been modified to form part of an insulated joint

2.2

solid insulating fishplate

a fishplate which is manufactured from insulating material

2.3

end post

a piece of insulating material suitable for insulating the adjacent ends of two rails

2.4

bush

a hollow cylinder of insulating material suitable for insulating the shank of a bolt from the piece of metal through which it passes

2.5

side plate

a piece of formed insulating material suitable for insulating a metal fishplate from the rails to which it is bolted

2.6

insulating plate

a flat piece of insulating material suitable for separating parts of a stretcher bar, sole plate or rod joint which it is desired to insulate

2.7

set of insulations

all of the pieces of insulating material required for insulating a rail joint, connecting rod, sole plate, etc.

3 Material

The material should be specified by the purchaser. The following types of material with their respective uses are given as a guide to established practice:

- 1) Synthetic-resin bonded fabric: Channel side plates, end posts, bushes and insulating plates.
- 2) Vulcanized fibre: Channel side plates, end posts, bushes and insulating plates.
- 3) Densified wood laminate: Solid insulating fishplates, end posts and insulating plates.

NOTE The following British Standards may be consulted when specifying the insulating material to be used:

BS 2966, *Phenolic resin-bonded cotton fabric sheets for electrical purposes*.

BS 1322, *Aminoplastic moulding materials*.

BS 216, *Vulcanized fibre (natural colour) sheets for electrical purposes*.

¹⁾ BS 47, “*Steel fishplates for bullhead and flat bottom railway rails*”.

BS 934, *Vulcanized fibre (natural colour) rods and tubes for electrical purposes.*
BS 2572, *Phenolic laminated sheet.*

4 Joint insulations for running rail

Running rail joint insulations may be of the “2-channel side plate”, “4-channel side plate” or “solid insulating fishplate” type for all sizes of rails covered by this standard. They shall conform to the shapes and dimensions shown in the following figures and tables:

Rail-joint insulations for bullhead rails.

- 2-channel side plate type Figure 9, Figure 10, Figure 12 (Table 4) and Figure 14.
- 4-channel side plate type Figure 9, Figure 11, Figure 13 (Table 5) and Figure 14.
- Solid insulating fishplate type Figure 12 (Table 4) and Figure 15.

Rail-joint insulations for flat bottom rails.

- 2-channel side plate type Figure 16 (or Figure 16A), Figure 17, Figure 19 and Figure 21 (Table 6, Table 7, Table 9 and Table 13).
- 4-channel side plate type Figure 16 or Figure 16A), Figure 18, Figure 20 and Figure 21 (Table 6, Table 8, Table 9 and Table 13).
- Solid insulating fishplate type Figure 19 and Figure 22 (Table 7 and Table 10).

NOTE The general arrangements should be as shown in Figure 1 for channel insulations and Figure 2 for solid insulations.

5 Sets of insulations for running rail joints

Sets of insulations for running rail joints shall be in accordance with Table 1.

Table 1 — Sets of insulations for running rail joints

Rail section	2-channel side plate type (Figure 1)	4-channel side plate type (Figure 1)	Solid insulating fishplate type (Figure 2)
Bullhead	2 channel-type side plates 1 end post 4 bushes	4 channel-type side plates 1 end post 4 bushes	2 fishplates 1 end post
Flat bottomed	2 channel-type side plates 1 end post 4 bushes	2 channel-type side plates, left-hand 2 channel-type side plates, right-hand 1 end post 4 bushes	2 fishplates 1 end post

6 Joint insulations for combined running and check rails

a) *Channel type.* The check rail joint insulation for both bullhead and flat bottom rails shall be the same as for the corresponding type of running rail. The bush for flat bottom rails shall be supplied 7 in (18 cm) long unless otherwise agreed. The general arrangement shall be as shown in Figure 3 and Figure 4 respectively.

NOTE For bullhead rails it may be necessary for the bush for the check rail to be shortened to suit conditions on site. For flat bottom rails the bush may have to be cut according to the flange-way clearance and some of the side plates and end posts may require to be cut to suit the check rail.

b) *Solid insulating fishplate type.* The combined running and check rail joint insulations for bullhead and flat bottom rails shall conform to the general arrangements shown in Figure 5 and Figure 6 respectively.

NOTE In order to specify a joint of this type it is necessary to give the rail sections, the amount of head wear of each, the rail end drilling details and the four principal dimensions shown on Figure 5 and Figure 6. These dimensions are determined by conditions on site and some of them may not always apply in which case they should be stated as zero (see Appendix A).

7 Sets of insulations for combined running and check rail joints

Sets of insulations for combined running and check rail joints shall be in accordance with Table 2.

Table 2 — Sets of insulations for combined running and check rail joints

Rail section	2-channel side plate type (Figure 3 and Figure 4) ^a	4-channel side plate type (Figure 3 and Figure 4)	Solid insulating fishplate type (Figure 5 and Figure 6)
Bullhead	4 channel-type side plates 2 end posts 8 bushes	8 channel-type side plates 2 end posts 8 bushes	4 fishplates ^a 1 spacer 2 end posts
Flat bottom	3 channel-type side plates, ordinary 1 channel-type side plate, cut for check rail 1 end post, ordinary 1 end post, cut for check rail 4 bushes	6 channel-type side plates, ordinary (3 right-hand, 3 left-hand) 2 channel-type side plates, cut for check rail (1 right-hand, 1 left-hand) 1 end post, ordinary 1 end post, cut for check rail 4 bushes	4 fishplates ^a 1 spacer 1 end post, ordinary 1 end post, cut back for check rail

^a These fishplates are not necessarily identical, see Note to Clause 6 b).

8 Sole plate and stretcher bar insulations

The insulations for sole plates and stretcher bars shall conform to the shapes and dimensions shown in the following figures:

Sole plates Figure 23, Figure 24 (Table 11) and Figure 29.

Stretcher bar Figure 25, Figure 26 and Figure 29.

Lock stretcher bar Figure 27, Figure 28 and Figure 29.

NOTE The general arrangement of sole plates and stretcher bar insulations should be as shown in Figure 7 and Figure 8.

9 Connecting rod insulations

The insulations for $\frac{3}{4}$ (19 mm) and $1\frac{1}{4}$ (32 mm) inch diameter connecting rods shall conform to the shapes and dimensions shown in Figure 30, Figure 31 and Figure 32 (Table 12).

10 Sets of insulations for sole plates, stretcher bars and connecting rods

Sets of insulations for sole plates, stretcher bars and connecting rods shall be in accordance with Table 3.

Table 3

Item	Insulating sections				
	Insulating plate	Insulating centre plate	Insulating side plate	Bushes	Washers
Sole plates	—	1	2	3	—
Stretcher bars	—	1	2	2	—
Lock stretcher bars	—	1	2	2	—
Connecting rods	1	—	—	2	4

11 Tolerances on dimensions

All dimensions shown in the figures shall be subject to the following tolerances unless otherwise stated:

Dimensions	Tolerance
Not exceeding 6 in (15 cm)	Plus or minus $\frac{1}{64}$ in (0.397 mm)
Exceeding 6 in (15 cm)	Plus or minus $\frac{1}{32}$ in (0.794 mm)

**Table 4 — Dimensions of end post for bullhead rails 2-channel
side plate type insulation (Figure 12)**
(Same end post for solid insulating fishplates)

Rail	A	B	C	D
	in	in	in	in
85R	$5\frac{15}{32}$	$2\frac{11}{16}$	$1\frac{11}{16}$	$1\frac{13}{16}$
90R	$5\frac{35}{64}$	$2\frac{3}{4}$	$\frac{3}{4}$	$1\frac{55}{64}$
95R	$5\frac{23}{32}$	$2\frac{3}{4}$	$\frac{3}{4}$	$1\frac{15}{16}$
100R	$5\frac{29}{32}$	$2\frac{3}{4}$	$\frac{3}{4}$	$2\frac{3}{32}$

**Table 5 — Dimensions of end post for bullhead rails 4-channel
side plate type insulation (Figure 13)**

Rail	A	B	D
	in	in	in
85R	$5\frac{15}{32}$	$2\frac{11}{16}$	$1\frac{15}{16}$
90R	$5\frac{35}{64}$	$2\frac{3}{4}$	$1\frac{63}{64}$
95R	$5\frac{23}{32}$	$2\frac{3}{4}$	$2\frac{1}{16}$
100R	$5\frac{29}{32}$	$2\frac{3}{4}$	$2\frac{7}{32}$

Table 6 — Dimensions of side plate type rail-joint insulations for flat bottom rails (Figure 16A, Figure 17 and Figure 18)

Rail	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
70A	in $2^{13/32} +0 -1/32$	in $1^{5/16}$	in $1^{3/32}$	in $5/16$	in $1^{13/16}$	in $1^{15/32}$	in $7/16$	in $1^{1/8} +1/32 -0$	in $2^{1/4}$	in 4	in $16^{1/2}$	in $1^{5/16}$	in 8	in 8	in $1^{3/4}$
75A	$2^{15/32} +0 -1/32$	$1^{11/32}$	$1^{1/8}$	$5/16$	$1^{7/8}$	$1^{1/2}$	$7/16$	$1^{3/16} +1/32 -0$	$2^{1/4}$	4	$16^{1/2}$	$1^{5/16}$	8	8	$1^{3/4}$
80A	$2^{19/32} +0 -1/32$	$1^{29/64}$	$1^{9/64}$	$11/32$	$1^{15/16}$	$1^{17/32}$	$1/2$	$1^{3/16} +1/32 -0$	$2^{1/4}$	4	$16^{1/2}$	$1^{7/16}$	8	8	$1^{3/4}$
85A	$2^{11/16} +0 -1/32$	$1^{1/2}$	$1^{3/16}$	$11/32$	2	$1^{9/16}$	$1/2$	$1^{1/4} +1/32 -0$	$2^{1/2}$	$4^{1/2}$	$18^{1/2}$	$1^{7/16}$	8	9	2
90A	$2^{25/32} +0 -1/32$	$1^{9/16}$	$1^{7/32}$	$3/8$	$2^{1/16}$	$1^{19/32}$	$1/2$	$1^{1/4} +1/32 -0$	$2^{1/2}$	$4^{1/2}$	$18^{1/2}$	$1^{17/32}$	8	9	2
95A	$2^{15/16} +0 -1/32$	$1^{21/32}$	$1^{9/32}$	$3/8$	$2^{1/8}$	$1^{11/16}$	$1/2$	$1^{5/16} +1/32 -0$	$2^{1/2}$	$4^{1/2}$	$18^{1/2}$	$1^{1/2}$	10	9	2
100A	3 $+0 -1/32$	$1^{45/64}$	$1^{19/64}$	$13/32$	$2^{3/16}$	$1^{11/16}$	$9/16$	$1^{5/16} +1/32 -0$	$2^{1/2}$	$4^{1/2}$	$18^{1/2}$	$1^{21/32}$	10	9	2
105A	$3^{3/32} +0 -1/32$	$1^{47/64}$	$1^{23/64}$	$13/32$	$2^{1/4}$	$1^{11/16}$	$9/16$	$1^{5/16} +1/32 -0$	$2^{1/2}$	$4^{1/2}$	$18^{1/2}$	$1^{7/16}$	10	9	2
110A	$3^{1/8} +0 -1/32$	$1^{3/4}$	$1^{3/8}$	$13/32$	$2^{5/16}$	$1^{11/16}$	$5/8$	$1^{5/16} +1/32 -0$	$2^{3/4}$	5	$20^{1/2}$	$1^{3/4}$	10	10	$2^{1/4}$

NOTE Dimensions P and Q apply only to 4-channel insulations. Dimension L applies only to 2-channel insulations.

Table 7 — Dimensions of end post for flat bottom rails 2-channel type insulation (Figure 19)
(Same end post for solid insulating fishplates)

Rail	A	B	C	D	F	G	H	J	K	L	M	N	P
70A	in $4\frac{7}{8}$	in $2\frac{3}{8}$	in $3\frac{1}{64}$	in $1\frac{9}{16}$	—	in $4\frac{3}{8}$	in $2\frac{7}{16}$	in $\frac{3}{8}$	in $\frac{7}{16}$	in 0	in $2\frac{15}{32} - 0 + \frac{1}{32}$	in $\frac{17}{32}$	in $\frac{1}{4}$
75A	$5\frac{1}{16}$	$2\frac{7}{16}$	$\frac{1}{2}$	$1\frac{21}{32}$	—	$4\frac{1}{2}$	$2\frac{17}{32}$	$\frac{7}{16}$	$\frac{7}{16}$	0	$2\frac{17}{32} - 0 + \frac{1}{32}$	$\frac{35}{64}$	$\frac{17}{64}$
80A	$5\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{3}{64}$	$1\frac{43}{64}$	—	$4\frac{5}{8}$	$2\frac{5}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	0	$2\frac{21}{32} - 0 + \frac{1}{32}$	$\frac{37}{64}$	$\frac{9}{32}$
85A	$5\frac{7}{16}$	$2\frac{9}{16}$	$\frac{17}{32}$	$1\frac{3}{4}$	—	$4\frac{13}{16}$	$2\frac{23}{32}$	$\frac{7}{16}$	$\frac{1}{2}$	0	$2\frac{3}{4} - 0 + \frac{1}{32}$	$\frac{37}{64}$	$\frac{9}{32}$
90A	$5\frac{5}{8}$	$2\frac{5}{8}$	$3\frac{5}{64}$	$1\frac{13}{16}$	—	5	$2\frac{13}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	0	$2\frac{27}{32} - 0 + \frac{1}{32}$	$3\frac{9}{64}$	$\frac{19}{64}$
95A	$5\frac{13}{16}$	$2\frac{3}{4}$	$3\frac{7}{64}$	$1\frac{27}{32}$	$3\frac{1}{8}$	$5\frac{1}{8}$	$2\frac{29}{32}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$3 - 0 + \frac{1}{32}$	$\frac{9}{16}$	$\frac{19}{64}$
100A	6	$2\frac{3}{4}$	$3\frac{19}{32}$	$1\frac{59}{64}$	$3\frac{1}{8}$	$5\frac{1}{4}$	3	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{3}{4}$	$3\frac{1}{16} - 0 + \frac{1}{32}$	$3\frac{7}{64}$	$5\frac{5}{16}$
105A	$6\frac{1}{8}$	$2\frac{3}{4}$	$5\frac{5}{8}$	$1\frac{59}{64}$	$3\frac{1}{8}$	$5\frac{3}{8}$	$3\frac{1}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{3}{4}$	$3\frac{5}{32} - 0 + \frac{1}{32}$	$5\frac{5}{8}$	$11\frac{1}{32}$
110A	$6\frac{1}{4}$	$2\frac{3}{4}$	$5\frac{5}{8}$	$1\frac{15}{16}$	$3\frac{1}{8}$	$5\frac{1}{2}$	3	$\frac{1}{2}$	$5\frac{5}{8}$	$\frac{3}{4}$	$3\frac{3}{16} - 0 + \frac{1}{32}$	$21\frac{1}{32}$	$3\frac{3}{8}$

Table 8 — Dimensions of end post for flat bottom rails 4-channel type insulation (Figure 20)

Rail	A	B	C	D	F	G	J	K	L	M	N	P
	in	in	in	in	in	in	in	in	in	in	in	in
70A	$4\frac{7}{8}$	$2\frac{3}{8}$	$\frac{7}{8}$	$1\frac{11}{16}$	—	$4\frac{3}{8}$	$\frac{3}{8}$	$\frac{5}{16}$	0	$2\frac{7}{32}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{21}{32}$	$\frac{3}{8}$
75A	$5\frac{1}{16}$	$2\frac{7}{16}$	$\frac{7}{8}$	$1\frac{25}{32}$	—	$4\frac{1}{2}$	$\frac{7}{16}$	$\frac{5}{16}$	0	$2\frac{9}{32}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{43}{64}$	$\frac{25}{64}$
80A	$5\frac{1}{4}$	$2\frac{1}{2}$	$\frac{15}{16}$	$1\frac{51}{64}$	—	$4\frac{5}{8}$	$\frac{7}{16}$	$\frac{3}{8}$	0	$2\frac{13}{32}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{45}{64}$	$\frac{13}{32}$
85A	$5\frac{7}{16}$	$2\frac{9}{16}$	$\frac{15}{16}$	$1\frac{7}{8}$	—	$4\frac{13}{16}$	$\frac{7}{16}$	$\frac{3}{8}$	0	$2\frac{5}{8}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{45}{64}$	$\frac{13}{32}$
90A	$5\frac{5}{8}$	$2\frac{5}{8}$	1	$1\frac{15}{16}$	—	5	$\frac{1}{2}$	$\frac{3}{8}$	0	$2\frac{19}{32}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{47}{64}$	$\frac{27}{64}$
95A	$5\frac{13}{16}$	$2\frac{3}{4}$	1	$1\frac{31}{32}$	$3\frac{1}{8}$	$5\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	$2\frac{7}{8}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{11}{16}$	$\frac{27}{64}$
100A	6	$2\frac{3}{4}$	$1\frac{1}{16}$	$2\frac{3}{64}$	$3\frac{1}{8}$	$5\frac{1}{4}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{4}$	$2\frac{15}{16}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{45}{64}$	$\frac{7}{16}$
105A	$6\frac{1}{8}$	$2\frac{3}{4}$	$1\frac{1}{16}$	$2\frac{3}{64}$	$3\frac{1}{8}$	$5\frac{3}{8}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{4}$	$3\frac{1}{32}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{3}{4}$	$\frac{15}{32}$
110A	$6\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{1}{16}$	$2\frac{1}{16}$	$3\frac{1}{8}$	$5\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$3\frac{1}{16}$ $\begin{smallmatrix} -0 \\ +1/32 \end{smallmatrix}$	$\frac{25}{32}$	$\frac{1}{2}$

Table 9 — Dimensions of bush for flat bottom rails (Figure 21)

Rail	A	B	L
	in	in	in
70A	$1\frac{1}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$\frac{7}{8} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{1}{8} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
75A	$1\frac{1}{8} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1\frac{5}{16} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{1}{8} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
80A	$1\frac{1}{8} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1\frac{5}{16} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{3}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
85A	$1\frac{3}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1 \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{1}{4} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
90A	$1\frac{3}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1 \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{5}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
95A	$1\frac{1}{4} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1\frac{1}{16} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{5}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
100A	$1\frac{1}{4} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1\frac{1}{16} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{7}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
105A	$1\frac{1}{4} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1\frac{1}{16} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{7}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$
110A	$1\frac{3}{8} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$	$1\frac{3}{16} \begin{smallmatrix} +\frac{1}{64} \\ -0 \end{smallmatrix}$	$1\frac{7}{16} \begin{smallmatrix} +0 \\ -0.01 \end{smallmatrix}$