Brief notes on rails & fastenings

Rails : The UIC 60 kg/m rail wction appearing in UIC code 861-3 and the following British Standard flat footed 0 rail sections appearing in BSS 11-1936 and reproduced in Indian Railway Standards Specification T-12, have been adopted for use on Indian Railways. These include the 52 kg per metre section but exclude 115 1b section which is now obsolete.

52 kg	For Broad Gauge having the same foot-width as BS No. 90R and facilitating the use of the same bearing plates & sleepers.
BS No. 90R	For Broad Gauge
BS No. 90R & 75R	For Metre Gauge
BS No. 60R	For Metre Gauge
BS No. 50R	This rail section has been in use over an appreciable kilometrage of Metre Gauge; but it is not being adopted in current designs. This will however be used for Narrow Gauge.

Due to the introduction of the metric system of weights and measures, the BS rails namely 90R, 75R, 60R, and 50R have not been redesigned but merely reproduced in the IRS Specification T-12 by indicating their dimensions and weight in metric equivalent upto two decimal places. The tables on pages RF 1 in 6 sheets give the main dimensions, calculated weights and properties of rail sections relevant to the two principal axes.

Fishplates: The rolled profile of fishplate for UIC 60 kg/m rail and its properties are given on page RF 3 in six sheets. The requirements as to their manufacture are governed by UIC code 864-4 and 864-8 (Appendix 2). Whereas "Revised 0 0 British Standard" rail sections have been adopted for use on Indian Railways, the British Standard fishplates designed for these sections have not been considered sufficiently strong for adoption as Standard in India. For this reason stronger and heavier fishplates

The fishplate designs as adopted and subsequently metricised appear in IRS Specification T-1. These metricised fishplates have been designed, keeping in view the requirement of free interchangeability with the corresponding FPS fishplates.

The details and tables on pages RF 3 in 5 sheets show their main dimensions, sections, properties, weights and part numbers.

Fishbolts : For reasons similar to those mentioned under fishplates, the fishbolts adopted on Indian Railways and shown on page RF2 are of larger diameter than the corresponding British Standard fishbolts. The metric fishbolts too have a free interchangeability with their FPS counter-parts. However metric fishbolts can not be used with FPS nuts and FPS fishbolts can not be used with metric nuts due to different threads.

The main design dimensions adopted for these fishbolts and nuts as also the other requirements relating to their manufacture and procurement appear in IRS Specification T-23.

Spring washers : Single and double coiled spring washers are shown on page RF2A sheet 1, for 25 mm dia. and 20 mm dia. bolts respectively.

Combination fishplates : The IRS designs shown on pages RF4 in 6 sheets comprise two main groups of sections :

Group I	having the IL and OR or OL and IR as identical combination fishplates.
Group II	having all IL, OR, OL and IR as different combination fishplates.

The different combinations falling under either of the above two groups have been prepared and the main dimensions and part numbers of the fishplates as well as those of the special fishbolts have been tabulated.

The IRS combination fishplates have been designed, with an adequate thickening up of the section in the middle

portion where the change in section takes place. Another feature of these designs is the elimination of the expansion joint, i.e. the rail ends are made to butt, which helps in making the joints considerably stronger than would be the case with ordinary joints.

A uniform system of marking the right or left hand and the inner or outer fishplates has been adopted. This is illustrated in the key plans on the drawings.

The combination fishplates have to be procured as per IRS Specification T-6.

Insulated rail joints : There are a variety of designs of insulated rail joints in use on the various Railway systems in the world. Some of these designs have proved to be very efficient in service, but the object of the IRS designs shown on pages RF 5 in 8 sheets is to provide a satisfactory joint without introducing specially rolled fishplates. For such insulated rail joints, standard fishplates have to be planed on the fishing planes to accommodate channel type insulation between the rails and the fishplates. Other insulating features are an end-post between the rail ends and bushes around the fishbolts.

The drawings for insulated rail joints for 60kg UIC, 52kg, BS Nos. 90R, 75R, 60R and 50R rails have been issued. The part numbers and their main dimensions are tabulated for reference.

Besides the above and in order to effect efficiency and economy, glued insulated rail joints have been adopted on Indian Railways. The glued joints have been included in IRS Track Manual Vol. II.

Rail expansion joints for bridges ; Two types of expansion joints have been designed :—

(a) With the rail end mitred.

(b) With the rail ends mitred but with a central rail piece in between.

Type (a) is for use on short span bridges upto 30.5 metres and type (b) on long spans above 30.5 metres and upto 76.2 metres. In both the types the outer fishplate is of a special section, the top face of which is level with the rail table, so as to support the wheel tread over the expansion gaps. This gap is a maximum of 26 mm in type (a) and 33 mm between the rail end and the central rail piece making a total of 66 mm in type (b); alternative types have been prepared to suit canted or uncanted rails.

The part numbers and the main dimensions for expansion joints and for the special fishplates are tabulated on pages RF 6 in 8 sheets.

A table showing gaps between rails at various temperatures for type (a) and another showing range of temperature for various spans with maximum expansion gap of 66 mm for type (b) have also been included.

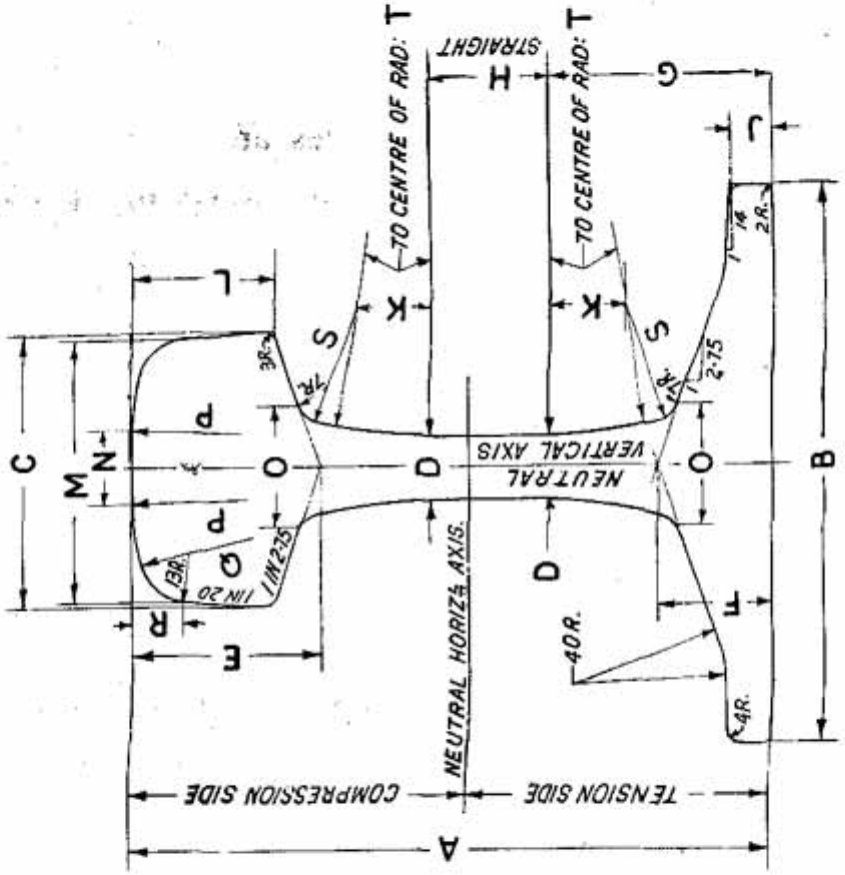
For welded track, expansion joints have been included in IRS Track Manual, Vol II.

Rail anchors : Spring steel rail anchors for UIC 60 kg, 52kg, 90R, 75R, 60R, 50R and 50NS rail sections are detailed on pages RF6A. They have to be procured as per IRS Specification T-24.

Table showing weights and quantities of rails and fastenings : Estimates of quantities and weights of rails, fishplates and fishbolts for track projects are often required to be made by the permanent way staff. To facilitate this work, the tables on pages RF7 in 4 sheets give the weight of each component, the number of components of each type per tonne and the weight of each component per track kilometre for the various rail lengths (full and shorts) of standard sections in common use. In addition, the total weight per track kilometre of rails and fastenings for the various rail lengths have also been tabulated for estimation purpose.

RF 1
SHEET 1 OF 6

UIC 60 kg F.F. RAIL SECTION



KEY TO TABLE OF DIMENSIONS

DIMENSIONS

RAIL SECTION	WEIGHT PER METRE	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
UIC 60kg	60 34	172	150	74·3	16·5	51	31·5	6025	32	11·5	19·5	37·5	72	21	33	300	80	14·3	35	120

PROPERTIES

RAIL SECTION	WEIGHT PER METRE	AREA OF SECTION	MOMENT OF INERTIA		SECTION MODULUS (HORIZONTAL AXIS)		MAX: DISTANCE FROM NEUTRAL HORIZONTAL AXIS	
			HORIZ^{L} AXIS	VERT^{L} AXIS	FOR COMP^{N}	FOR TENS^{N}	COMP^{N} SIDE	TENS^{N} SIDE
	kg	cm^2	cm^4	cm^4	cm^3	cm^3	mm	mm
UIC 60kg	60·34	76·86	3055	512·9	335·5	377·4	91·05	80·95

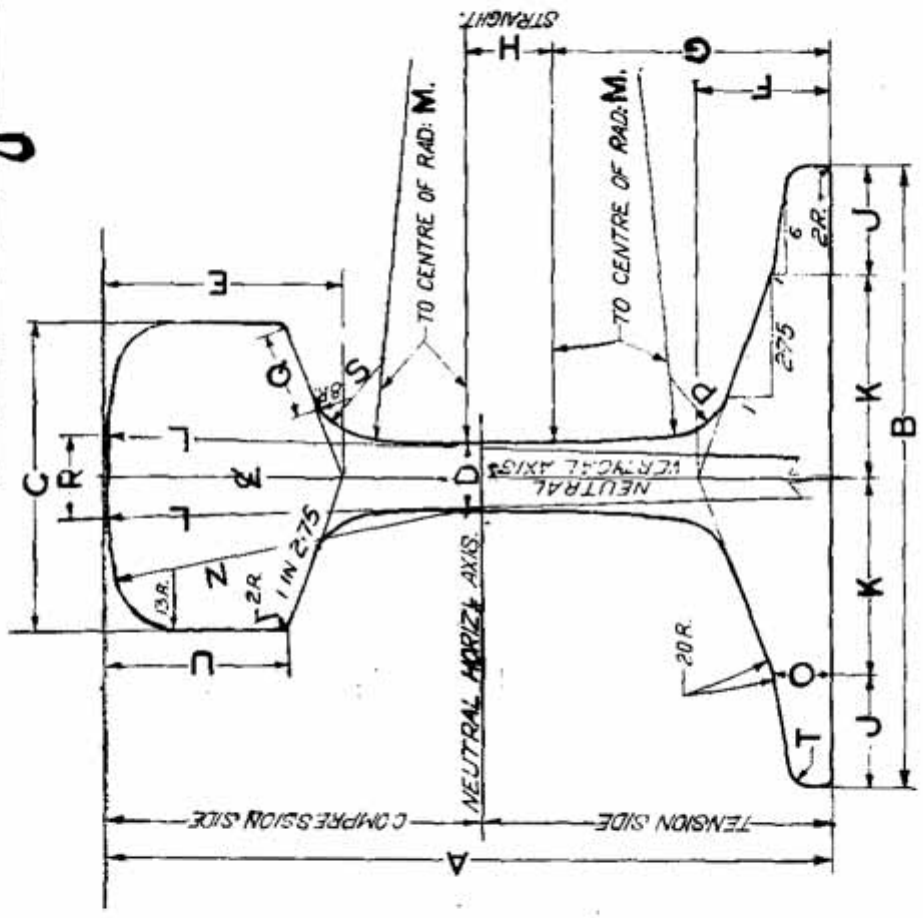
NOTE:

THE DIMENSIONS AND PROPERTIES OF THE UIC 60 kg RAIL SECTION HAVE BEEN ADOPTED FROM UIC CODE 861-3 (3rd EDITION).

RF 1
SHEET 2 OF 6

RF 1
SHEET 3 OF 6

I. R. S. 52 kg F. F. RAIL SECTION



KEY TO TABLE OF DIMENSIONS

DIMENSIONS

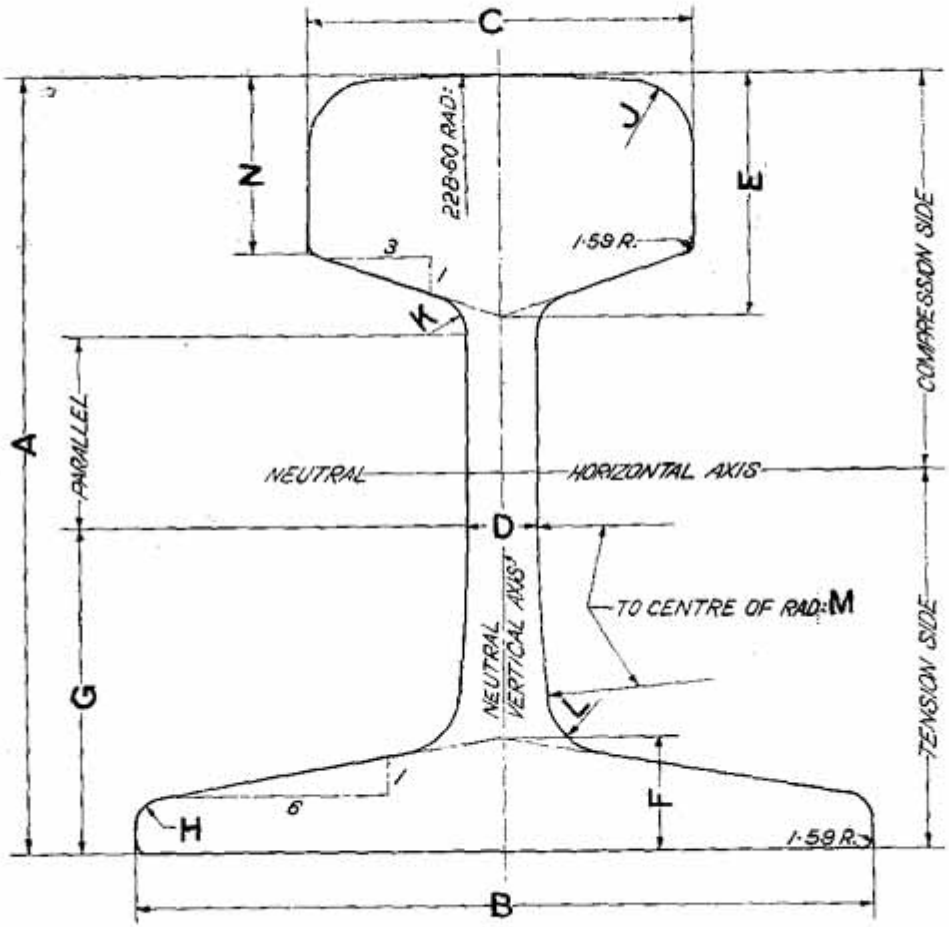
RAIL SECTION	WEIGHT PER METRE	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U
	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
52 kg	51·89	156	138	67	15·5	51	29	60	19	24	44	305	381	80	13	13	17·5	18	225	5	38·82

PROPERTIES

RAIL SECTION	WEIGHT PER METRE	AREA OF SECTION	MOMENT OF INERTIA		SECTION MODULUS (HORIZONTAL AXIS)		MAX: DISTANCE FROM NEUTRAL HORIZONTAL AXIS	
			HORIZ^{L} AXIS	VERT^{L} AXIS	FOR COMP^{N}	FOR TENS^{N}	COMP^{N} SIDE	TENS^{N} SIDE
	kg	cm^2	cm^4	cm^4	cm^3	cm^3	mm	mm
52 kg	51·89	66·15	2158	363	268·50	285·50	80·41	75·59

RFI SHEET 4 OF 6

BRITISH STANDARD F.F. RAIL SECTIONS



KEY TO TABLE OF DIMENSIONS

RF I
SHEET 5 OF 6

DIMENSIONS

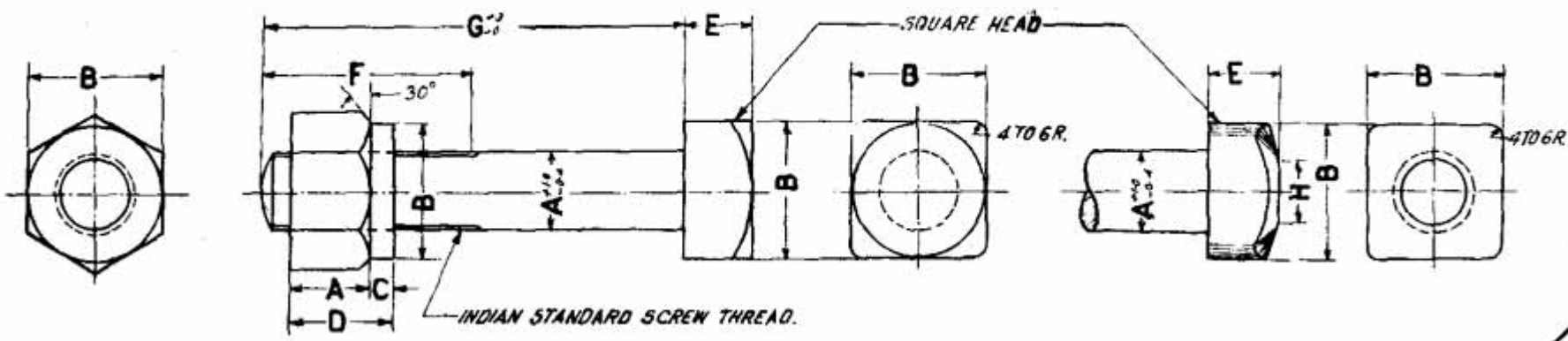
B.S.N°	WEIGHT PER METRE	A	B	C	D	E	F	G	H	J	K	L	M	N
	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
50R.	24·80	104·78	100·01	52·39	9·92	32·94	15·08	43·66	3·97	9·53	5·56	8·73	228·60	24·21
60R.	29·76	114·30	109·54	57·15	11·11	35·72	16·67	47·63	3·97	9·53	5·56	8·73	228·60	26·20
75R.	37·13	128·59	122·24	61·91	13·10	39·69	18·65	53·98	4·76	11·11	6·35	9·53	304·80	29·37
90R.	44·61	142·88	136·53	66·68	13·89	43·66	20·64	58·93	4·76	12·70	9·53	9·53	381·00	32·55

PROPERTIES

B.S.N°	WEIGHT PER METRE	AREA OF SECTION	MOMENT OF INERTIA		SECTION MODULUS (HORIZONTAL AXIS)		MAX: DISTANCE FROM NEUTRAL HORIZONTAL AXIS	
			HORIZ^L AXIS	VERT^L AXIS	FOR COMP^N	FOR TENS^N	COMP^N SIDE	TENS^N SIDE
	Kg	cm^2	cm^4	cm^4	cm^3	cm^3	mm	mm
50R.	24·80	31·68	476·17	106·87	88·98	93·08	53·59	51·18
60R.	29·76	38·00	676·79	145·68	115·36	121·92	58·67	55·63
75R.	37·13	47·37	1055·56	230·18	159·28	169·44	66·29	62·30
90R.	44·61	56·95	1600·00	320·91	213·85	235·65	74·93	67·95

RF 1 SHEET 69 OF 96

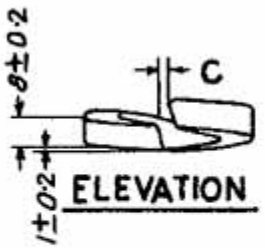
FISHBOLTS & NUTS



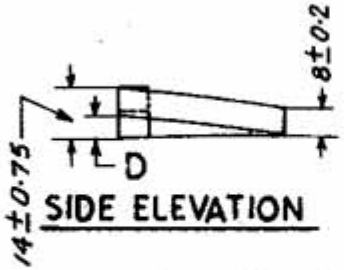
RF 2
SHEET 1 OF 1

MAIN DIMENSIONS OF FISHBOLTS & NUTS

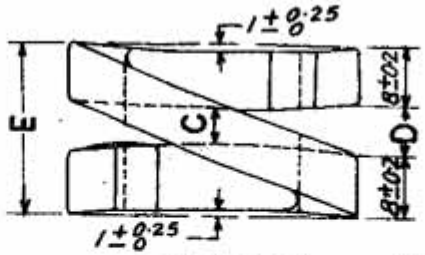
RAIL SECTION	PART NUMBER	DIMENSIONS								WEIGHT APPROX: (WITH ORDINARY HEAD)
		A	B	C	D	E	F	G	H	
		mm	mm	mm	mm	mm	mm	mm	mm	Kg/PIECE
UIC 60 Kg	RDSO/T-1899	25 DIA:	41	8	33±0·80	22± 0·65	65	140	–	–
52 Kg & 90R.	RDSO/T-3549	25 DIA.	41	8	33±0·80	22± 0·65	75	140	20·5	0·979
52 Kg, 90R & 75R.	T 11501	25 DIA:	41	8	33±0·80	22±0·65	65	130	20·5	0·940
60R.	T 11502	22 DIA:	36	7	29±0·65	19±0·65	51	105	18	0·654
50R.	T 11503	18 DIA:	32	6	24±0·65	17±0·55	44	90	16	0·420



ELEVATION

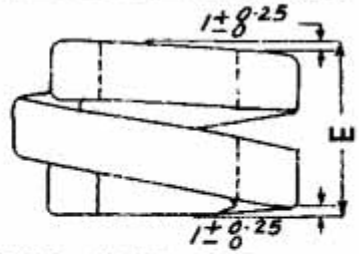


SIDE ELEVATION

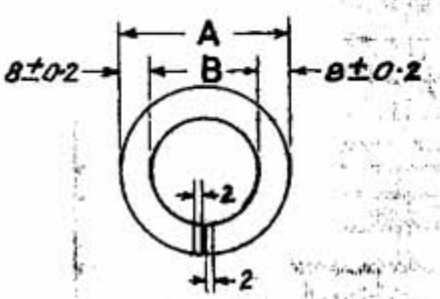


ELEVATION

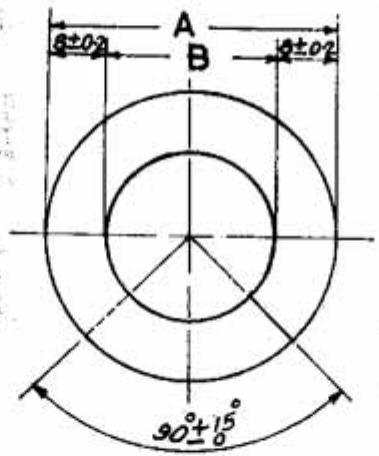
SPRING WASHER



SIDE ELEVATION



PLAN



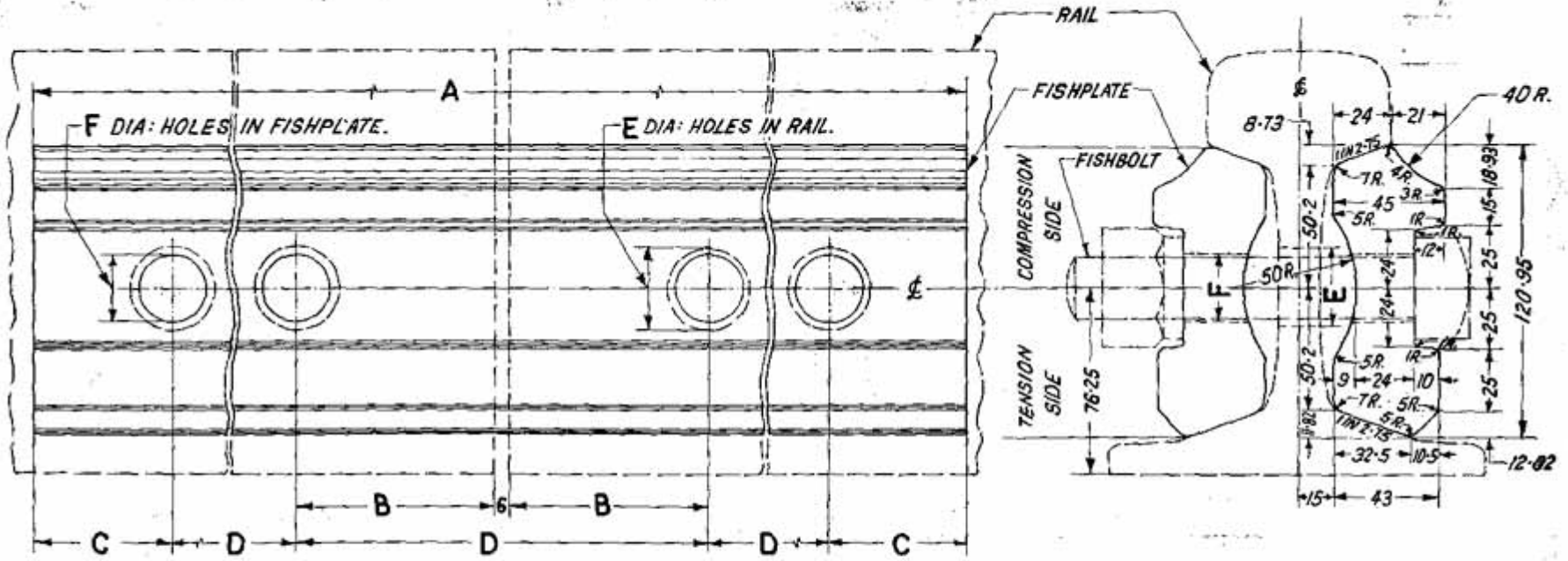
PLAN

RF 2A
SHEET 1 OF 1

TABLE OF DIMENSIONS

	DRAWING NUMBER	DIA: OF BOLT/PLATE SCREW	DIMENSIONS (mm) A	B	C	D	E
SINGLE COIL	T-10773	25	44·4 max	$27^{+1·0}_{0}$	2·5±1·0	6±0·5	
DOUBLE COIL	RDSO/T-1878	20	$38^{+1·4}_{0·4}$	$22^{+1·0}_{0}$	$5^{+0}_{·0}$	7±0·9	$23^{+1·0}_{0·6}$

FISHPLATE



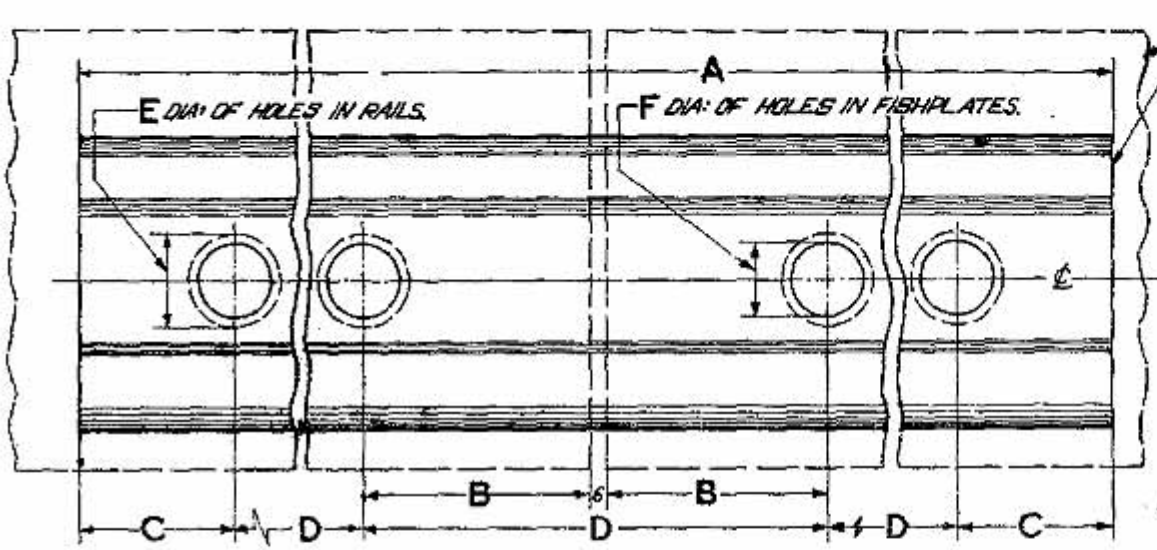
MAIN DIMENSIONS & PROPERTIES OF FISHPLATE

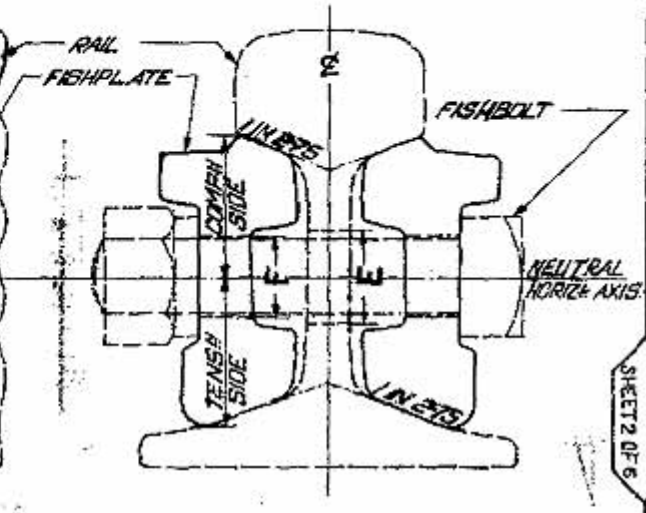
RAIL SECTION	PART NUMBER	DIMENSIONS						MOMENT OF INERTIA (PER PAIR)	MAX: DISTANCE FROM NEUTRAL HORIZONTAL AXIS		SECTION MODULUS HORIZONTAL AXIS (PER PAIR)	WEIGHT APPROX: (PER PAIR)
		A	B	C	D	E	F	HORIZL AXIS	COMPN SIDE	TENSN SIDE	FOR COMPN / FOR TENSN	
		mm	mm	mm	mm	mm	mm	cm^4	mm	mm	cm^3	kg
UIC 60 kg	RDSO/T-1898	610	80	56	166	32	27	875·8			1450	35·20

SHEET 1 OF 6

RF 3

FISHPLATE



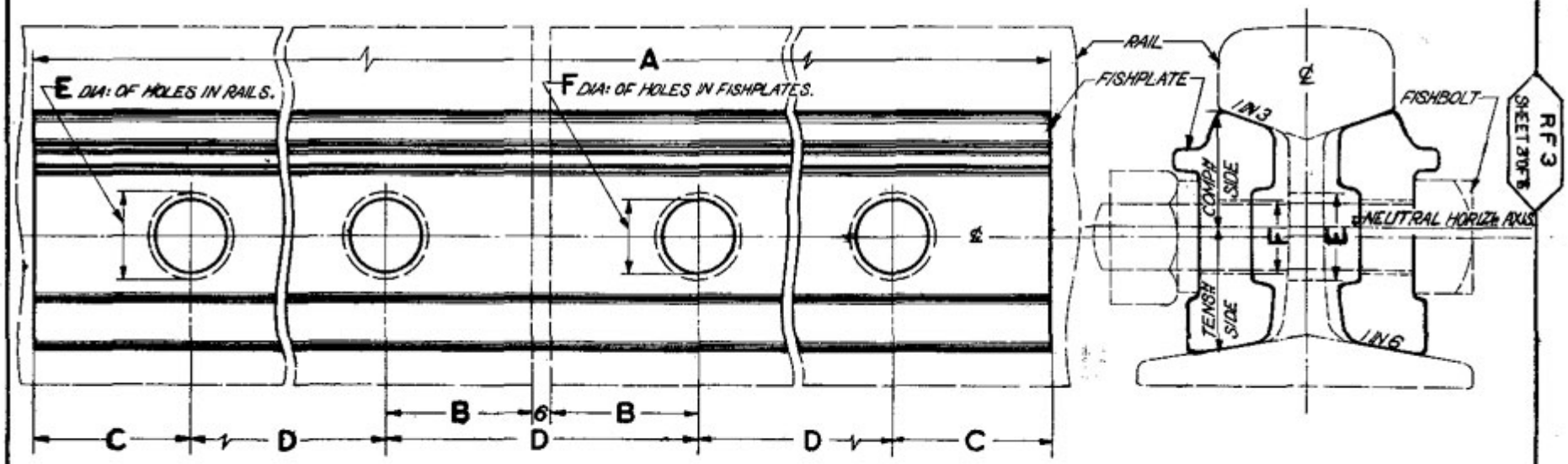


RF 3
SHEET 2 OF 6

MAIN DIMENSIONS & PROPERTIES OF FISHPLATE

RAIL SECTION	PART NUMBER	DIMENSIONS						MOMENT OF INERTIA (PER PAIR)	MAX: DISTANCE FROM NEUTRAL HORIZONTAL AXIS		SECTION MODULUS HORIZONTAL AXIS (PER PAIR)		WEIGHT APPROX: (PER PAIR)
		A	B	C	D	E	F	HORIZ^L AXIS	COMPN SIDE	TENSN SIDE	FOR COMPN	FOR TENSN	
		mm	mm	mm	mm	mm	mm	cm^4	mm	mm	cm^3	cm^3	kg
52 kg	T 050(M)	610	80	56	166	32	27	644·00	50·36	52·88	128·02	121·77	28·71

FISHPLATES

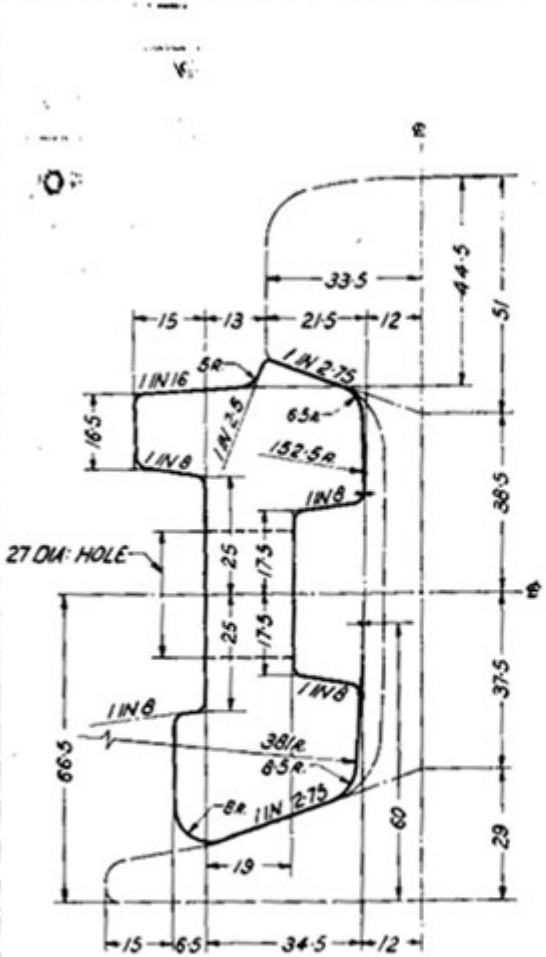

E DIA: OF HOLES IN RAILS.
F DIA: OF HOLES IN FISHPLATES.
A
B
B
C
D
D
D
C
RAIL
FISHPLATE
FISHBOLT
1/N 3
COMPN SIDE
TENSN SIDE
1/N 6
NEUTRAL HORIZL AXIS
RF 3
SHEET 30

MAIN DIMENSIONS & PROPERTIES OF FISHPLATES

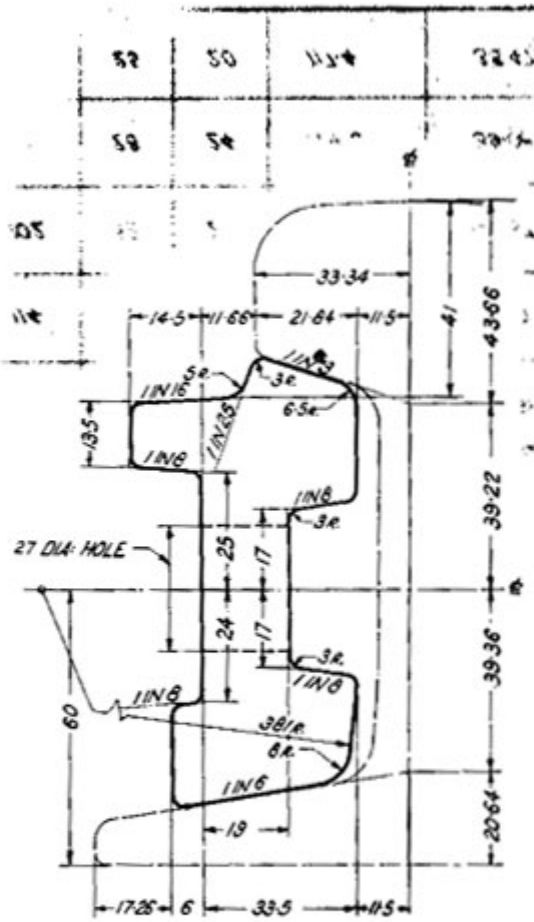
RAIL SECTION	PART NUMBER	DIMENSIONS						MOMENT OF INERTIA (PER PAIR)	MAXIMUM DISTANCE FROM NEUTRAL HORIZONTAL AXIS		SECTION MODULUS HORIZONTAL AXIS (PER PAIR)		WEIGHT APPROX: (PER PAIR)
B.S.N#		A	B	C	D	E	F	HORIZONTAL AXIS	COMP# SIDE	TENS# SIDE	FOR COMP#	FOR TENS#	kg
		mm	mm	mm	mm	mm	mm	cm^4	mm	mm	cm^3	cm^3	
90R.	T1(M)	610	80	56	166	32	27	484·0	47·70	49·30	101·42	98·20	26·11
90R.	T2(M)	610	80	56	166	32	27	474·0	48·50	48·66	97·74	97·42	25·93
90R.	T059(M)	460	54	59	114	32	27	484·0	47·70	49·30	101·42	98·20	19·54
75R.	T060(M)	420	48	57	102	32	27	298·0	43·37	43·63	68·72	68·30	13·58
60R.	T061(M)	410	48	52	102	28	24	174·3	39·08	37·42	44·59	46·59	9·975
50R.	CSO/C 1898(M)	410	48	52	102	25	20	117·4	35·47	34·53	33·10	34·00	8·307

RF 3
SHEET 4 OF 6

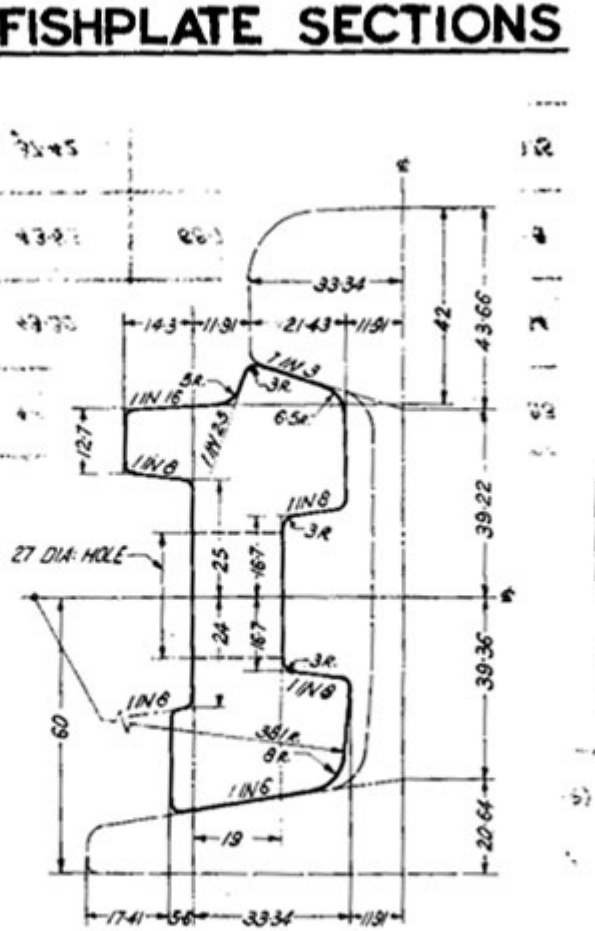
FISHPLATE SECTIONS



FISHPLATE 52 kg-T 090(M)

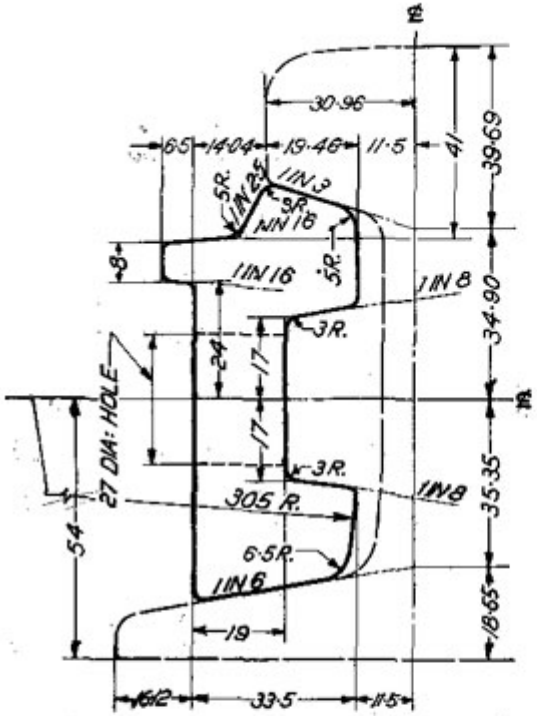


FISHPLATE 90R.-T 059(M) & T1(M)

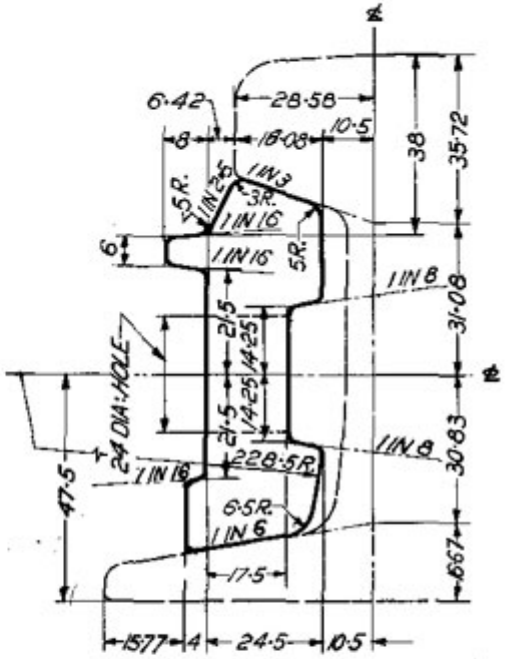


ALTERNATIVE FISHPLATE 90R.-T 2(M)

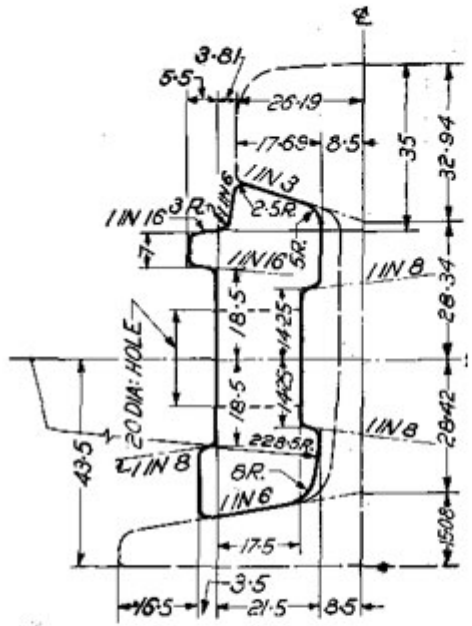
RF 3
SHEETS 036



FISHPLATE 75R.-T 060(M)



FISHPLATE 60R.-T 061 (M)

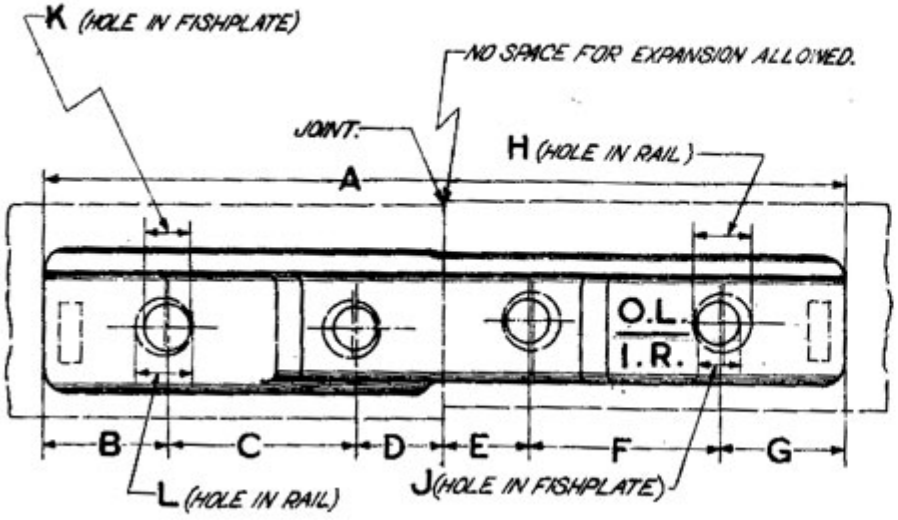


FISHPLATE 50R. CSO/C-1898(M)

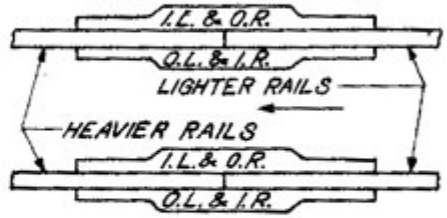
NOTE :-
1. ALL RADII ARE 2 mm EXCEPT WHERE OTHERWISE SHOWN.
2. FOR MAIN DIMENSIONS & PROPERTIES OF FISHPLATES, SEE PAGES RF 3 (SHEETS 1, 2 & 3 OF 5)

RF 3
SHEET 6 OF 6

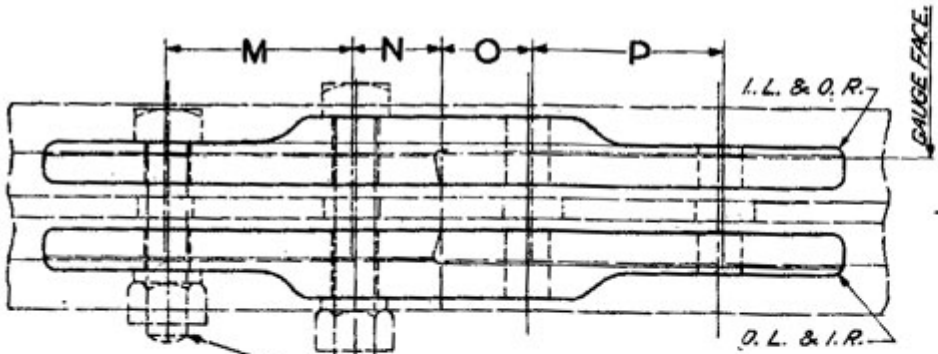
COMBINATION FISHPLATES



NO.	
90 R.	90 B.S.
75 R.	75 B.S.
60 R.	60 B.S.
52 kg	90 R.
52 kg	90 B.S.



KEY PLAN OF FISHPLATES

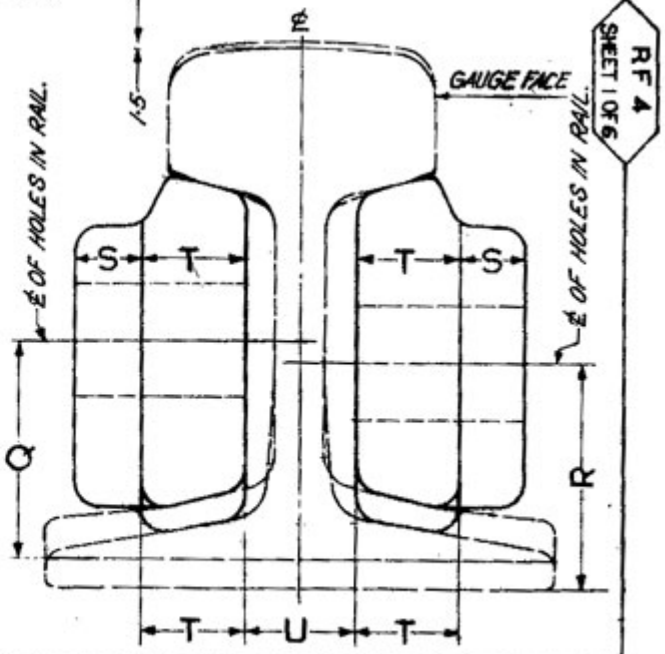


DIRECTION OF FIXING HAND OF FISHPLATES.

T 11501 FOR B.S. N°s 90R.-90, B.S. N°s 75R.-75, 52kg – B.S. N°s 90R. & 52kg – B.S. N°s 90.
T 11502 FOR B.S. N°s 60R.-60.

T 11838 FOR B.S. N°s 90R.-90, B.S. N°s 75R.-75, 52kg – B.S. N°s 90R. & 52kg – B.S. N°s 90.
T 11639 FOR B.S. N°s 60R.-60.

ALLOWANCE FOR WEAR OF OLD B.S. RAILS.



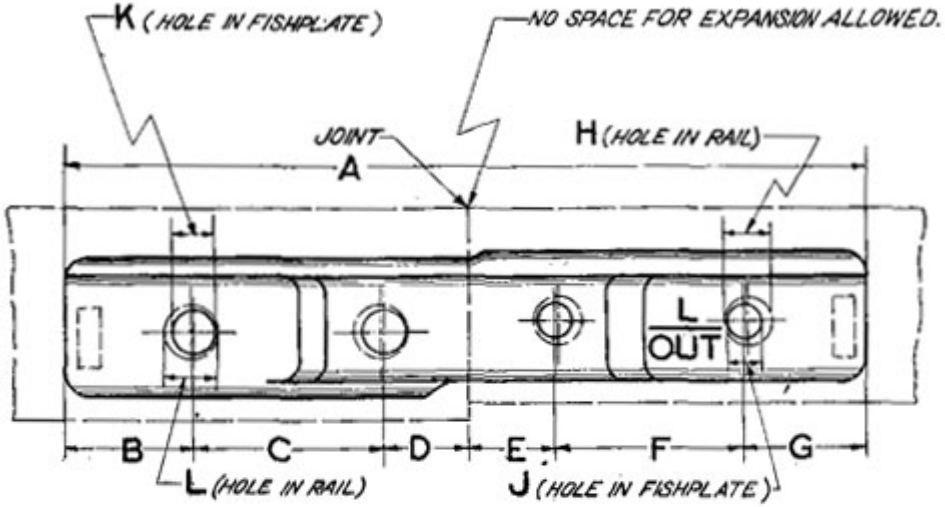
RF 4
SHEET 1 OF 6

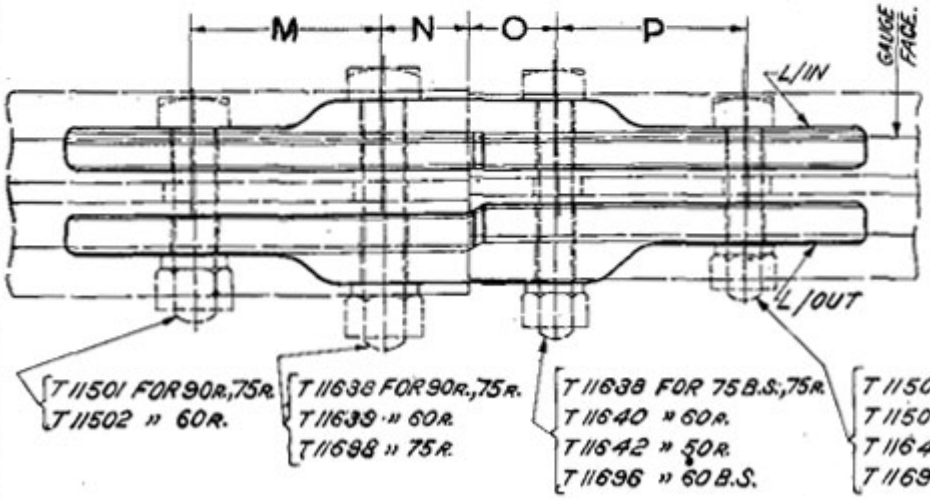
PART NUMBERS & MAIN DIMENSIONS OF COMBINATION FISHPLATES

RAIL SECTIONS TO BE JOINED	PART Nos		DIMENSIONS (mm)																			
	O.L. OR I.R.	I.L. OR O.R.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U
90 R. — 90 B.S.	T10559	T10560	460	61	114	52	53	114	66	30	27	27	32	114	54	54	114	58	60	18	27	28
75 R. — 75 B.S.	T10561	T10562	430	65	102	46	47	102	68	30	27	27	32	102	48	48	102	51·5	54	18	27	28
60 R. — 60 B.S.	T10563	T10564	430	68·5	102	46·5	46·5	102	64·5	28	24	24	28	102	48	48	102	46	47·5	14	22	24
52 kg — 90 R.	CSO/C 1900(M)	CSO/C 1901(M)	535	61	166	78	52	114·3	63·7	32	27	27	32	166	80	54	114·3	59·93	66·5	18	27	28
52 kg — 90 B.S.	CSO/C 1944(M)	CSO/C 1945(M)	590	61	166	78	72	152·4	60·6	30	27	27	32	166	80	73	152·4	58	66·5	18	27	28

RF 4
SHEET 2 OF 6

COMBINATION FISHPLATES



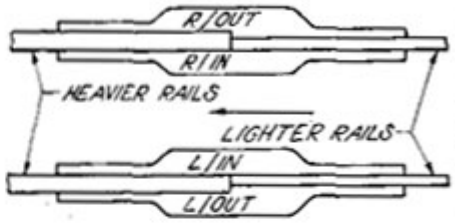


T 11501 FOR 90R., 75R.
T 11502 » 60R.

T 11638 FOR 90R., 75R.
T 11639 » 60R.
T 11698 » 75R.

T 11638 FOR 75 B.S., 75R.
T 11640 » 60R.
T 11642 » 50R.
T 11696 » 60 B.S.

T 11501 FOR 75 B.S., 75R.
T 11502 » 60R.
T 11641 » 50R.
T 11697 » 60 B.S.

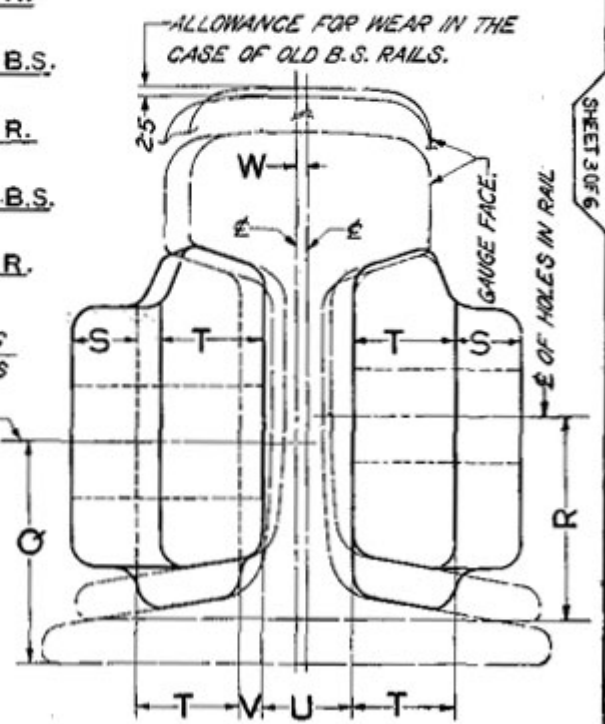


KEY PLAN OF FISHPLATES

90 R. — 75 R.
90 R. — 75 B.S.
75 R. — 60 R.
75 R. — 60 B.S.
60 R. — 50 R.

DIRECTION OF FIXING HAND OF FISHPLATES

℄ OF HOLES IN RAIL



RF 4
SHEET 3 OF 6

PART NUMBERS & MAIN DIMENSIONS

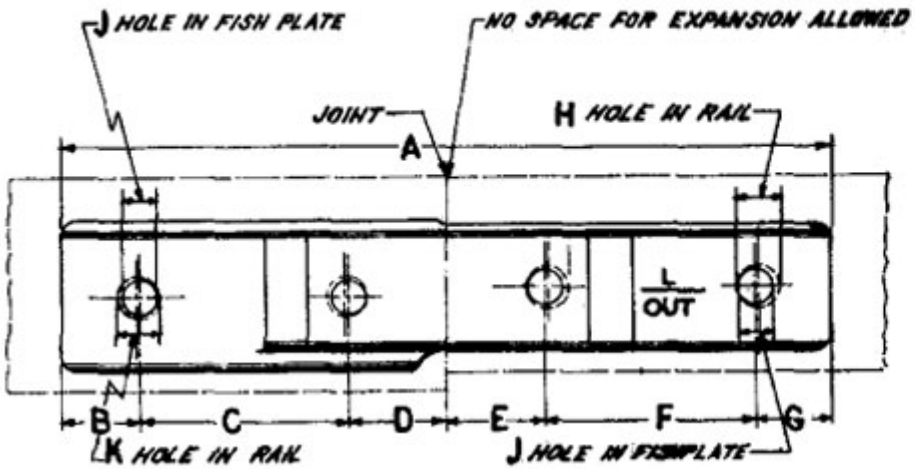
RAIL SECTIONS TO BE JOINED	PART NUMBERS			
	L/OUT	L/IN	R/IN	R/OUT
90 R.—75 R.	T10491	T10492	T10493	T10494
90 R.—75 B.S.	T10565	T10566	T10567	T10568
75 R.—60 R.	T10495	T10496	T10497	T10498

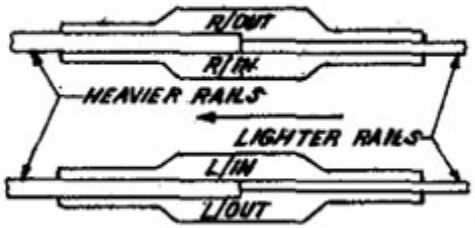
RAIL SECTIONS TO BE JOINED	PART NUMBERS			
	L/OUT	L/IN	R/IN	R/OUT
75 R.—60 B.S.	CSO/C-2033(M)	CSO/C-2034(M)	CSO/C-2035(M)	CSO/C-2036(M)
60 R.—50 R.	T10499	T10500	T10501	T10502

RF 4
SHEET 4 OF 6

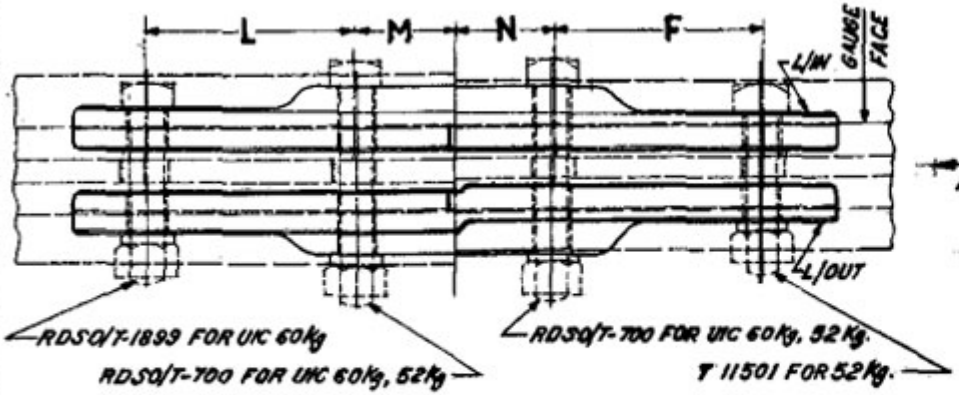
RAIL SECTIONS TO BE JOINED	DIMENSIONS (mm)																					
	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
90 R.—75 R.	440	61	114	52	46	102	65	32	27	27	32	114	54	48	102	60	54	18	27	23	5	2·38
90 R.—75 B.S.	440	61	114	52	47	102	64	30	27	27	32	114	54	48	102	60	51·5	18	27	23	5	2·38
75 R.—60 R.	430	65	102	46	46·5	102	68·5	28	24	27	32	102	48	48	102	54	47·5	16	25	21	5	2·38
75 R.—60 B.S.	430	67	102	46	46·5	102	66·5	28	24	27	32	102	48	48	102	53·98	46	16	25	24	5	2·5
60 R.—50 R.	430	68·5	102	46·5	46	102	65	25	20	24	28	102	48	48	102	47·5	43·5	14	22	19	5	2·38

COMBINATION FISHPLATES



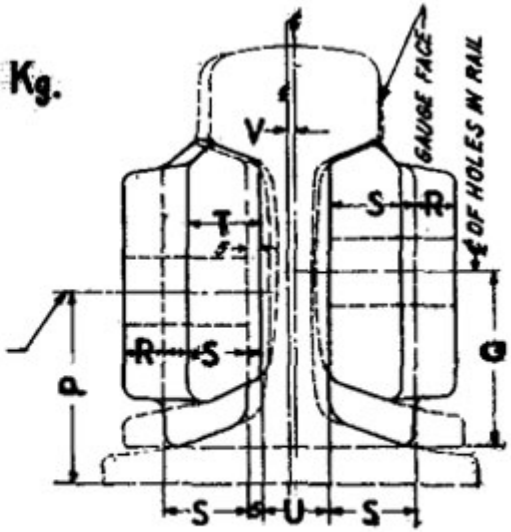


KEY PLAN OF FISHPLATES



UIC 60 Kg. —— 52 Kg.

DIRECTION OF FIXING
HAND OF FISHPLATES



RF 4 SHEETS

PART NUMBERS & MAIN DIMENSIONS

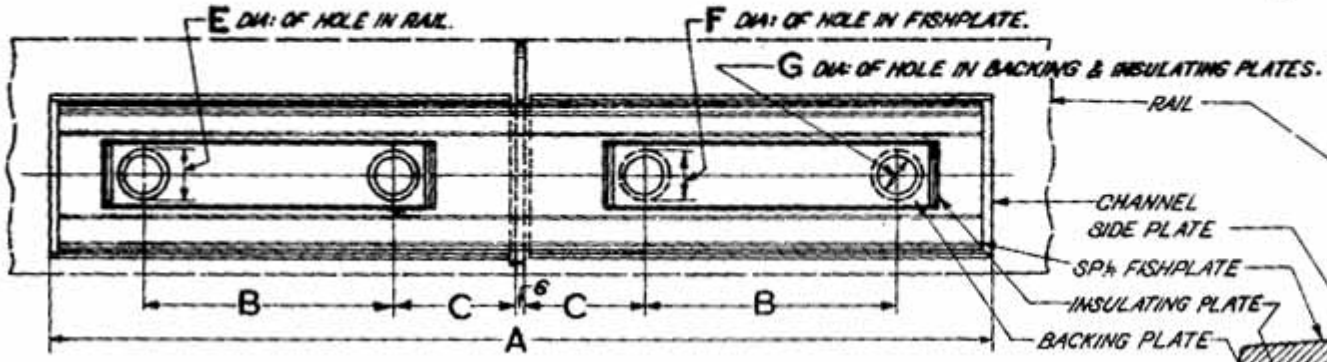
RAIL SECTIONS TO BE JOINED	PART NUMBERS			
	L/OUT	L/IN	R/IN	R/OUT
UIC 60 kg–52 kg	RDSO/T-696	RDSO/T-697	RDSO/T-698	RDSO/T-699

RAIL SECTIONS TO BE JOINED	DIMENSIONS (mm)																			
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
UIC 60 kg–52 kg.	610	61	166	78	78	166	61	32	27	32	166	80	80	76·25	66·5	16	34	29	28	2·5

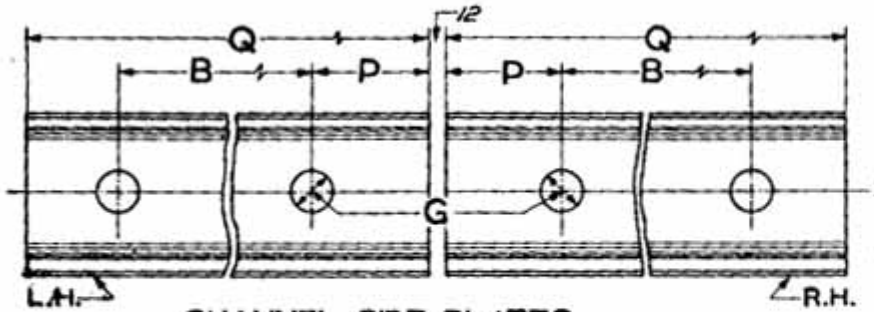
RF 4
SHEET 6 OF 6

INSULATED RAIL JOINT

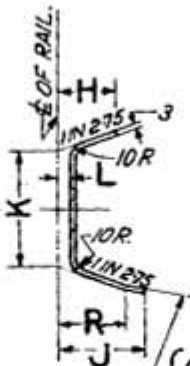
(ALT: FOUR CHANNEL TYPE)



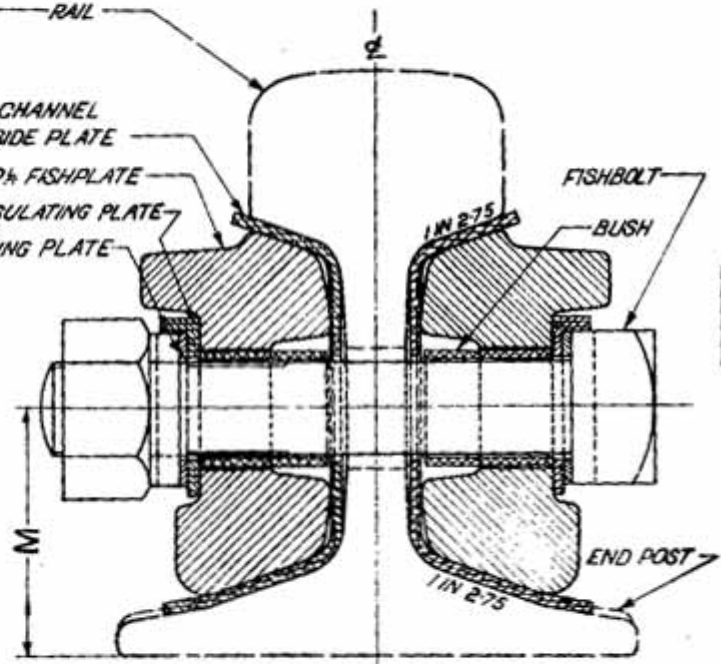
ELEVATION OF INSULATED RAIL JOINT (BOLTS REMOVED)



CHANNEL SIDE PLATES



1 IN 6 FOR 52 Kg
1 IN 14 FOR UIC 60 Kg



SECTION OF INSULATED RAIL JOINT

RF 5
SHEET 1 OF 2

PART NUMBERS AND MAIN DIMENSIONS

RAIL SECTION	ASSEMBLY DRG: Nº	CHANNEL SIDE PLATES	DIMENSIONS (mm)													
			A	B	C	E	F	G	H	J	K	L	M	P	Q	R
UIC 60 kg	SA 22181	S 22183-84	622	166	80	⊗	32	27	42	58	89·5	11·5	76·25	77	305	48
52 kg	SA 22101	S 22103-04	622	166	80	⊗	32	27	37	56	76	9	66·5	77	305	44

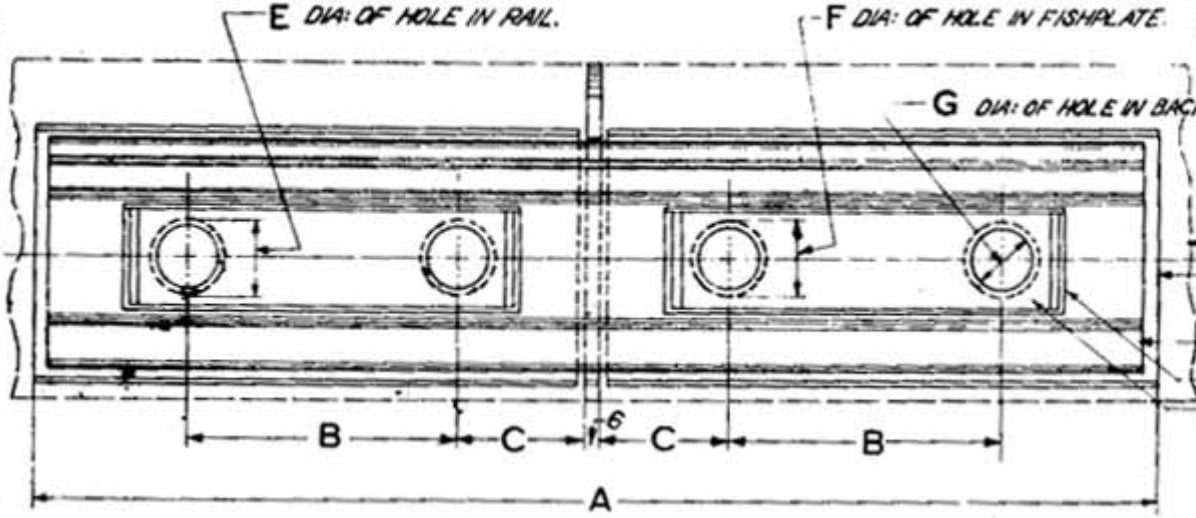
● BOLT DIA (D) + 0·2 mm

RAIL SECTION	UIC 60 kg	52 kg
FISHPLATE (PART Nº)	S 22182	S 22102
END POST " "	S 22185	S 22105
INSULATING PLATE " "	S 22176	S 22106
BACKING PLATE " "	S 22177	S 22107
BUSH " "	S 22179	S 22109
FISHBOLT & NUT " "	S 22180	S 22110

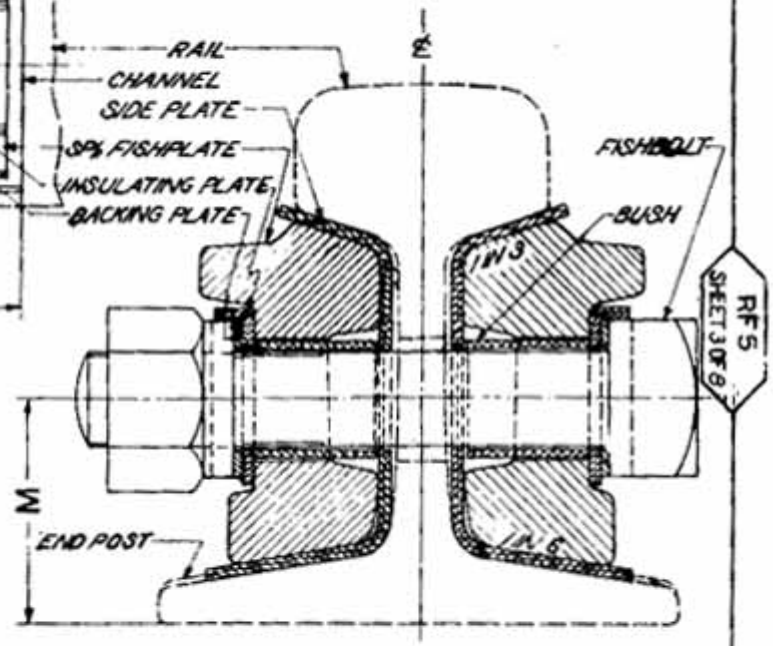
RF 5
SHEET 2 OF 8

INSULATED RAIL JOINTS

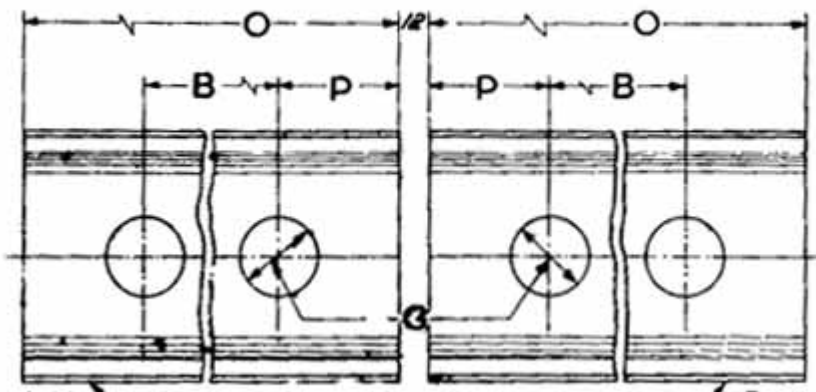
(ALT: FOUR CHANNEL TYPE)



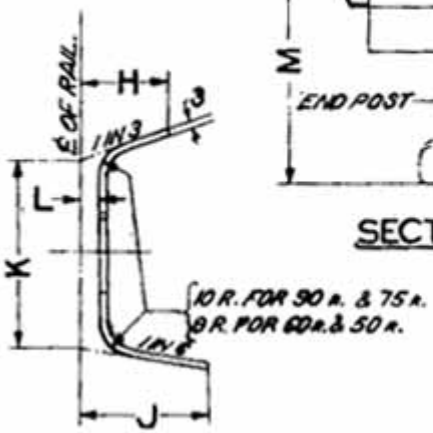
ELEVATION OF INSULATED RAIL JOINT (BOLTS REMOVED)



SECTION OF INSULATED RAIL JOINT



CHANNEL SIDE PLATES



PART NUMBERS AND MAIN DIMENSIONS

RAIL SECTION	ASSEMBLY DRG. No.	CHANNEL SIDE PLATES	DIMENSIONS (mm)												
			A	B	C	E	F	G	H	J	K	L	M	O	P
90R.	SA 22111	S 22113-14	472	114	54	⊗	32	27	37	54	78·58	8	60	230	51
75R.	SA 22121	S 22123-24	432	102	48	⊗	32	27	35	48	70·25	8	54	210	45
60R.	SA 22131	S 22133-34	422	102	48	⊗	29	24	32	42	61·91	7	47·5	205	45
50R.	SA 22141	S 22143-44	422	102	48	⊗	25	20	30	36·5	56·76	5·5	43·5	205	45

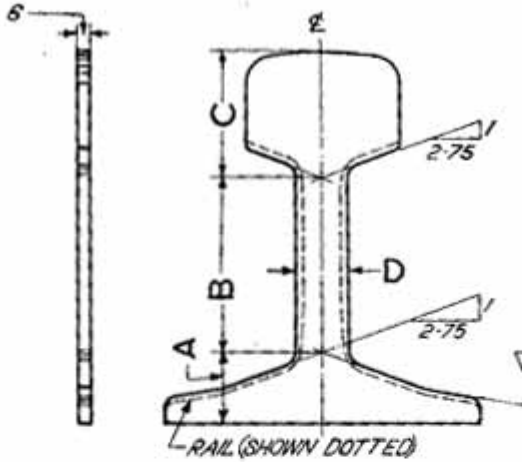
⊗ BOLT DIA (O) + 02 mm

RAIL SECTION	90R.	75R.	60R.	50R.
FISHPLATE (PART No.)	S 22112	S 22122	S 22132	S 22142
END POST " "	S 22115	S 22125	S 22135	S 22145
INSULATING PLATE " "	S 22116	S 22126	S 22136	S 22146
BACKING PLATE " "	S 22117	S 22127	S 22137	S 22147
FISHBOLT & NUT " "	S 22110	S 22110	S 22140	S 22150
BUSH " "	S 22109	S 22109	S 22139	S 22149

RF 5
SHEET 4 OF 8

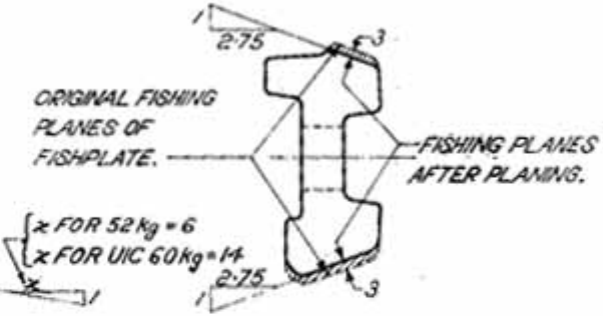
INSULATED RAIL JOINTS

DETAILS OF PARTS



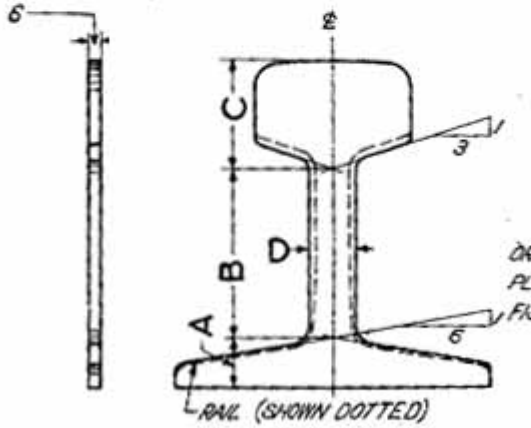
END POST

(FOUR CHANNEL TYPE ALT:)



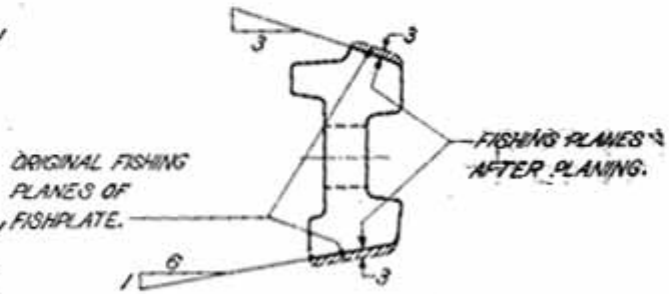
SPECIAL FISH PLATE

FOR UIC 60 kg & 52 kg



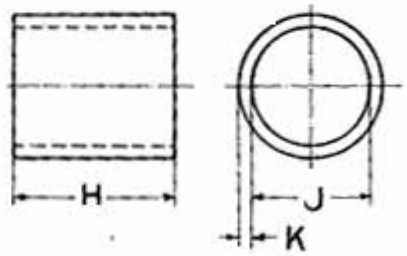
END POST

(FOUR CHANNEL TYPE ALT:)



SPECIAL FISH PLATE

FOR OTHER RAIL SECTIONS



BUSH

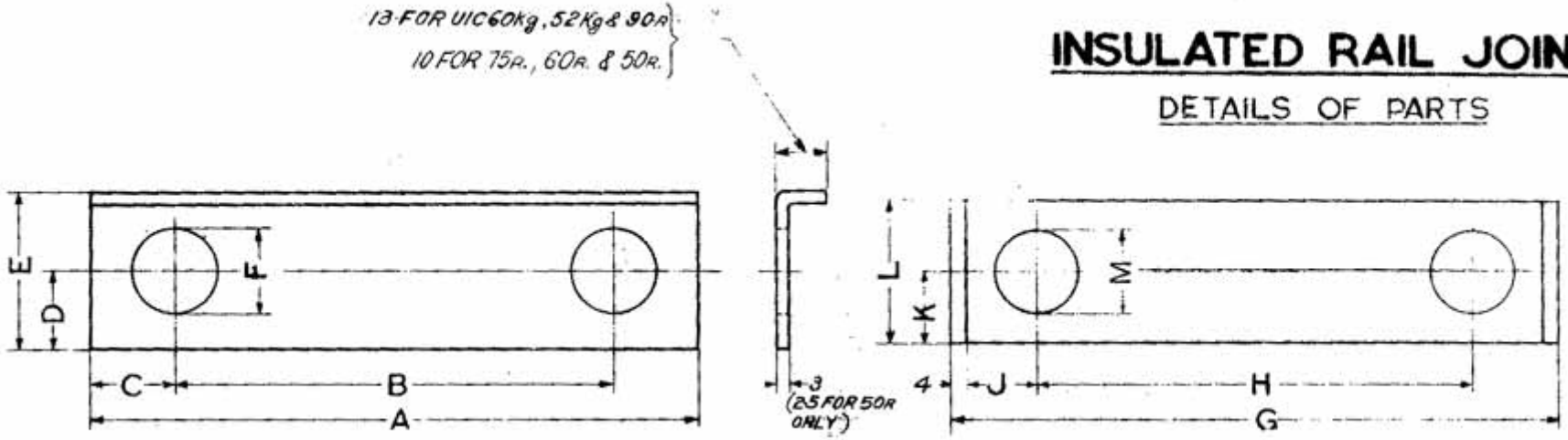
RFS SHEET 5 OF 8

PART NUMBERS AND MAIN DIMENSIONS

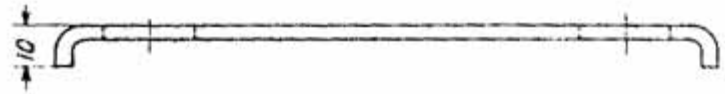
TYPE	RAIL SECTION	FISHPLATE	END POST					BUSH			
		PART NUMBER	PART NUMBER	DIMENSIONS(mm)				PART NUMBER	DIMENSIONS(mm)		
				A	B	C	D		H	J	K
FOUR CHANNEL TYPE	UIC60 kg	S22182	S22185	33	85	54	24·5	S22179	31	26·4	2·4
	52 kg	S22102	S22105	31	71	54	22	S22109	33	26	2·5
	90R	S22112	S22115	22	74·5	46·5	20	S22109	33	26	2·5
	75R	S22122	S22125	20	66·1	42·5	20	S22109	33	26	2·5
	60R	S22132	S22135	18	57·8	38·5	18	S22139	24	23	2·5
	50R	S22142	S22145	17	51·8	36	16	S22149	21	19	2·5

INSULATED RAIL JOINTS

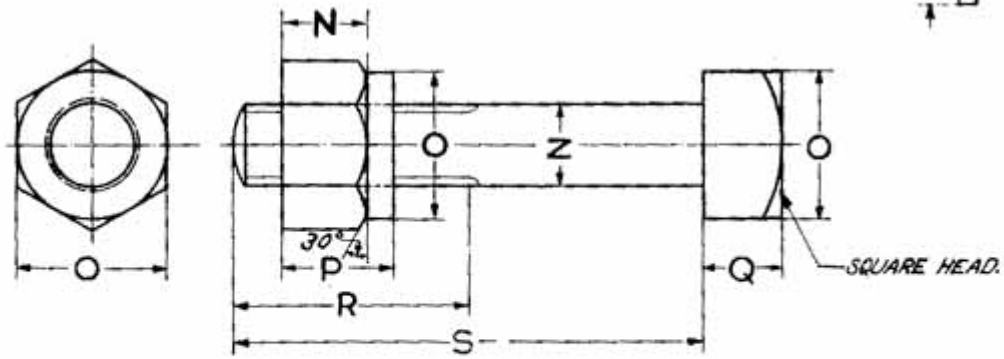
DETAILS OF PARTS



INSULATING PLATE



BACKING PLATE



FISHBOLT & NUT

RF 5
SHEET 7 OF 8

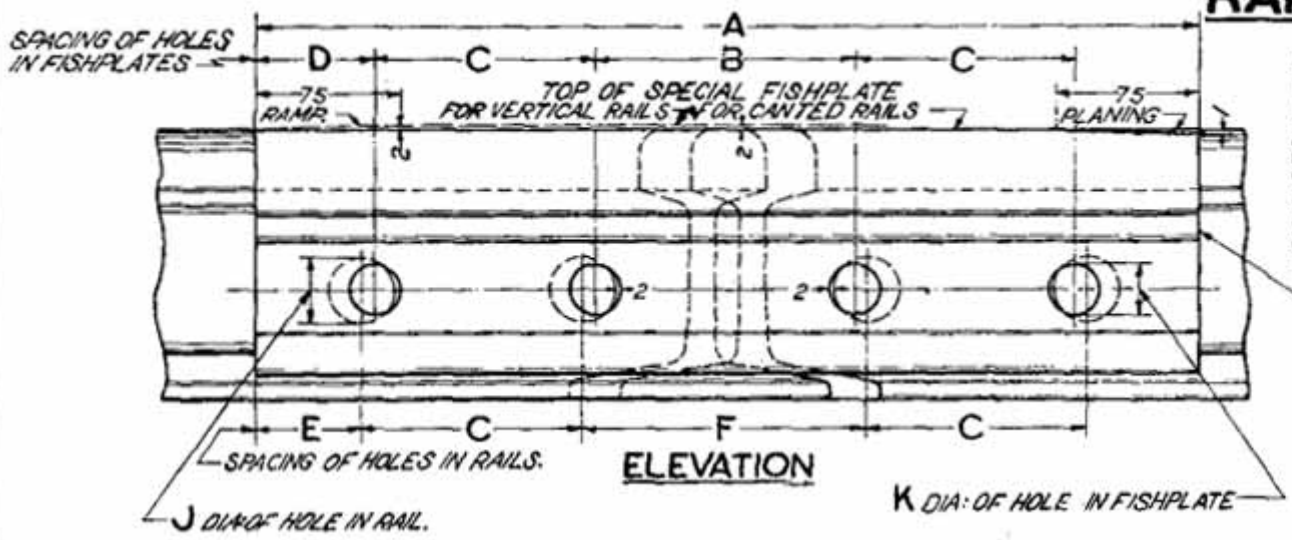
PART NUMBERS AND MAIN DIMENSIONS

TYPE	RAIL SECTION	INSULATING PLATE							BACKING PLATE							FISHBOLT & NUT						
		PART NUMBER	DIMENSIONS (mm mm)						PART NUMBER	DIMENSIONS (mm mm)						PART NUMBER	DIMENSIONS (mm mm)					
			A	B	C	D	E	F		G	H	J	K	L	M		N	O	P	Q	R	S
FOUR CHANNEL TYPE	UIC [illegible]	S 22176	220	166	27	22·5	45	27	S 22177	214	166	20	19·5	39	27	S 22180	25	39	33	22	55	147
	[illegible]	S 22106	220	166	27	23	47	27	S 22107	216	166	21	20	40	27	S 22110	25	41	33	22	70	144
	90 R.	S 22116	168	114	27	23	47	27	S 22117	164	114	21	20	40	27	S 22110	25	41	33	22	70	144
	75 R.	S 22126	156	102	27	23	46·5	27	S 22127	152	102	21	20	40	27	S 22110	25	41	33	22	70	144
	60 R.	S 22136	150	102	24	20	41	24	S 22137	147	102	18·5	18	36	24	S 22140	22	36	29	19	50	120
	50 R.	S 22146	142	102	20	18	36·5	20	S 22147	143	102	16·5	16	32	20	S 22150	18	32	24	17	50	100

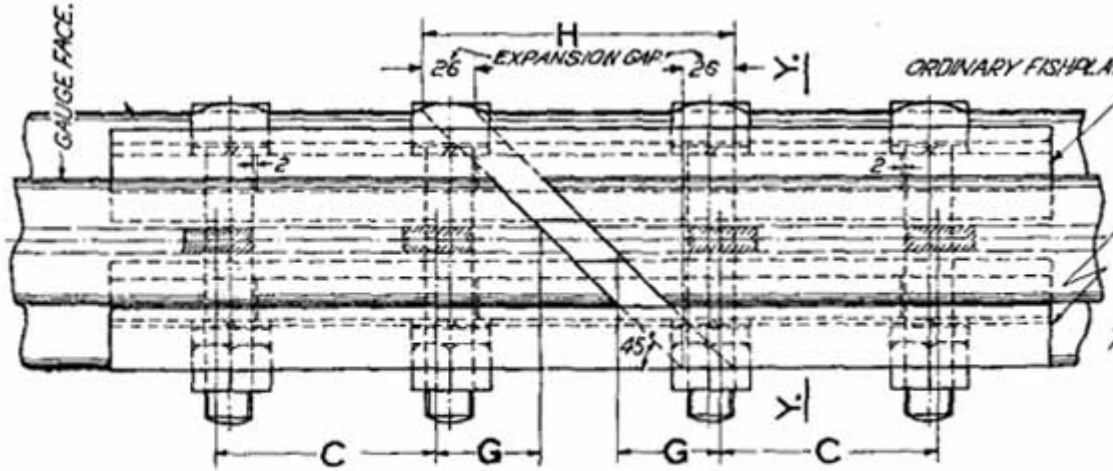
NOTE:-
ALL THESE DIMENSIONS ARE OF NOMINAL VALUE, FOR WORKING DIMENSIONS REFER ORIGINAL DRAWINGS.

RF 5
SHEET 8 OF 8

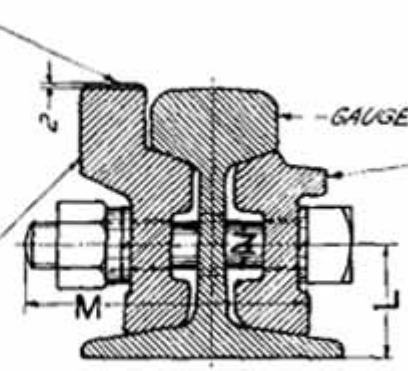
RAIL EXPANSION JOINTS



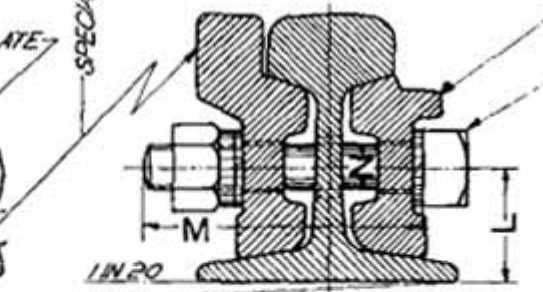
ELEVATION



PLAN



SECTION ON Y.Y.
FOR VERTICAL RAILS.



SECTION ON Y.Y.
FOR CANTED RAILS.

RF 6
SHEET 1 OF 8

FOR PLATE GIRDER BRIDGES UP TO 30.5 METRES CLEAR SPANS

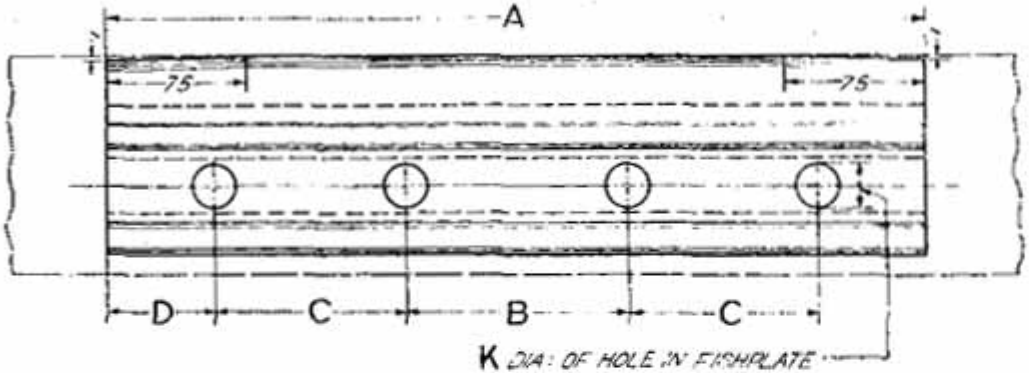
DRAWING NUMBERS & MAIN DIMENSIONS

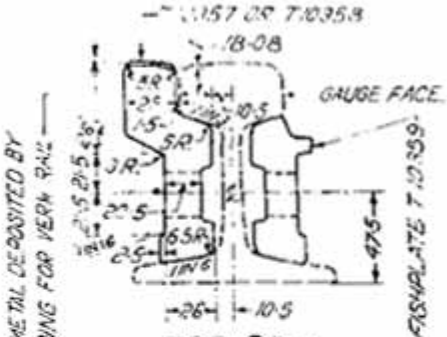
RAIL SECTION & DRAWING Nº		DIMENSIONS (mm)												
		A	B	C	D	E	F	G	H	J	K	L	M	N
52 kg	T 10345 OR T 10346	650	188·5	166	65	58·5	201·5	80	162	36	27	66·5	145	25
90R.	T 10392 OR T 10393	490	135	114	63	56·5	148	54	162·5	36	27	60	145	25
75R.	T 10446 OR T 10447	440	122	102	57	50·5	135	48	148	36	27	54	145	25
60R.	T 10355 OR T 10356	440	120	102	58	51·5	133	48	135·5	33	24	47·5	120	22

TEMPERATURE °C	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°
GAP BETWEEN RAILS IN mm	26	24	22	20	18	16	14	12	10	8	6	4	2	0

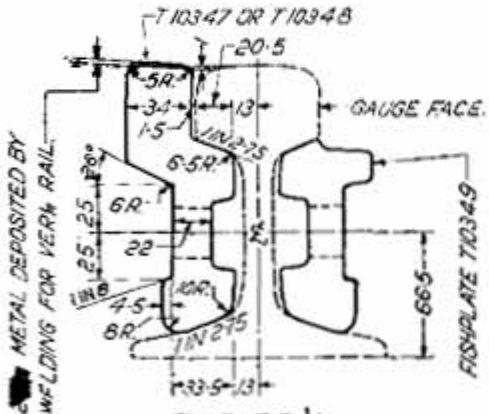
RF 6
SHEET 2 OF 8

SPECIAL FISHPLATES FOR EXPANSION JOINTS

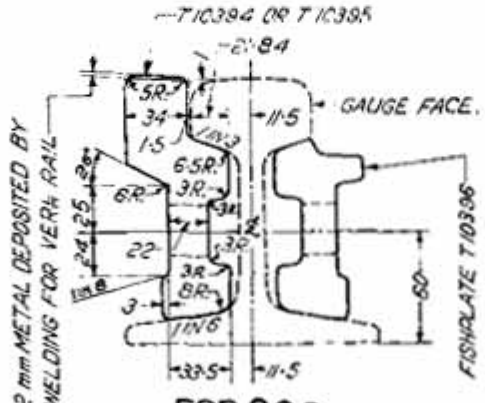




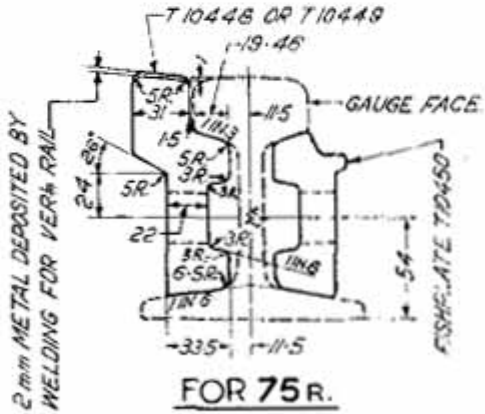
FOR 60R.



FOR 52kg



FOR 90R.



FOR 75R.

RF 6
SHEET 3 OF 8

FOR PLATE GIRDER BRIDGES UP TO 30.5 METRES CLEAR SPANS

PART NUMBERS AND MAIN DIMENSIONS

RAIL SECTION & DRG: Nº.		SPECIAL FISHPLATE (OUT SIDE)		ORDINARY FISHPLATE (IN SIDE)	FISHBOLT	DIMENSIONS (mm)				
		FOR RAILS VERTICAL	FOR RAILS CANTED			A	B	C	D	K
52 kg	T 10345 OR T 10346	T 10348	T 10347	T 10349	T 11692	650	188·5	166	65	27
90 R.	T 10392 OR T 10393	T 10394	T 10395	T 10396	T 11692	490	135	114	63	27
75 R.	T 10446 OR T 10447	T 10449	T 10448	T 10450	T 11692	440	122	102	57	27
60 R.	T 10355 OR T 10356	T 10358	T 10357	T 10359	T 11693	440	120	102	58	24

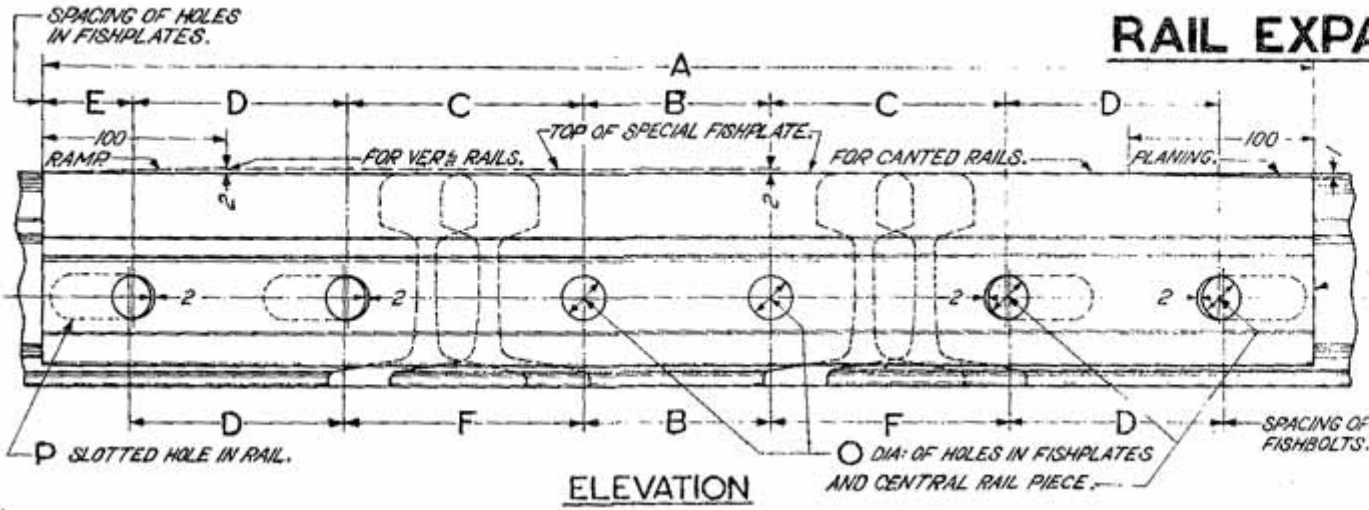
NOTE:–

SECTION OF SPECIAL FISHPLATES FOR CANTED RAILS IS THE SAME AS THAT FOR VERTICAL RAILS. IN CASE OF VERTICAL RAILS, 2 mm METAL IS DEPOSITED BY WELDING AT THE TOP & IS RAMPED DOWN AT THE ENDS FOR 75 mm LENGTH. IN CASE OF CANTED RAILS, THE FISHPLATE ITSELF IS PLANED AT THE ENDS BY 1mm FOR 75 mm LENGTH AS SHOWN IN THE ELEVATION ABOVE.

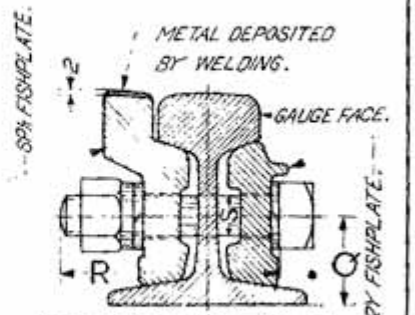
ALL RADII ARE 2mm EXCEPT WHERE OTHERWISE SHOWN.

RF6
SHEET 4 OF 8

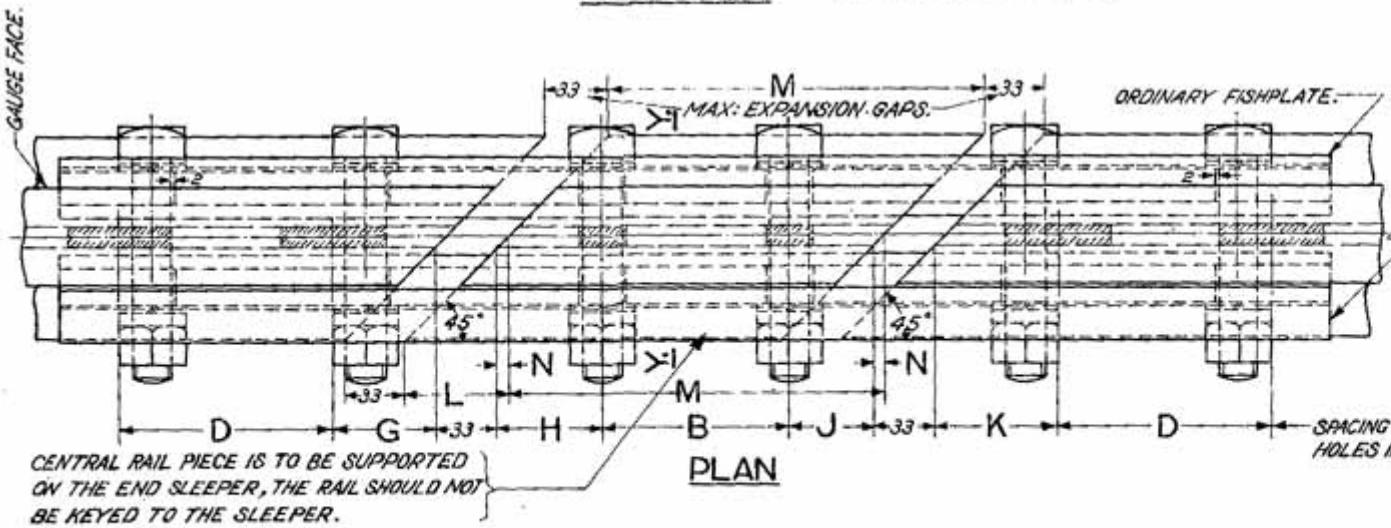
RAIL EXPANSION JOINTS



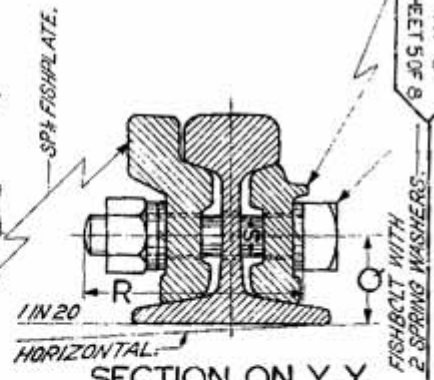
ELEVATION



SECTION ON Y.Y.
FOR VERTICAL RAILS.



PLAN



SECTION ON Y.Y.
FOR CANTED RAILS.

RF 9
SHEET 5 OF 8

FOR GIRDER BRIDGES ABOVE 30.5 METRES & UP TO 76.2 METRES CLEAR SPANS

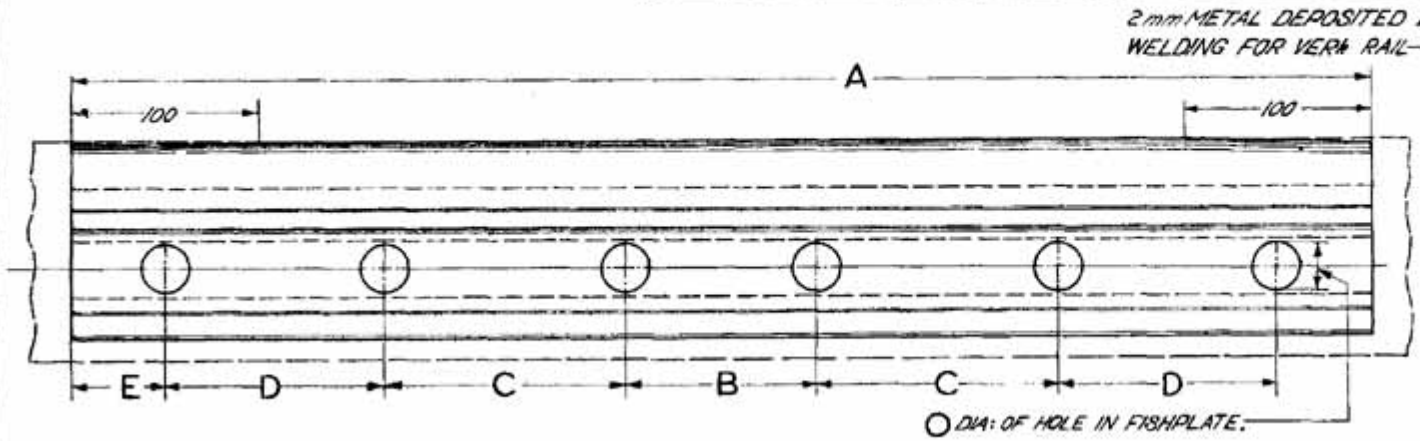
RF 6
SHEET 6 OF 8

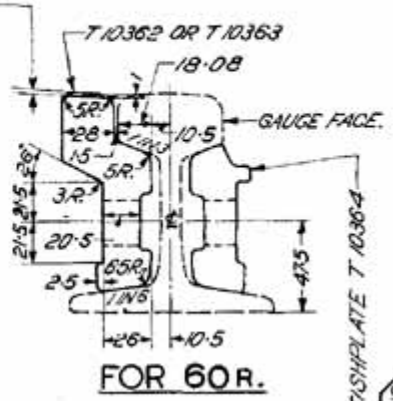
DRAWING NUMBERS & MAIN DIMENSIONS

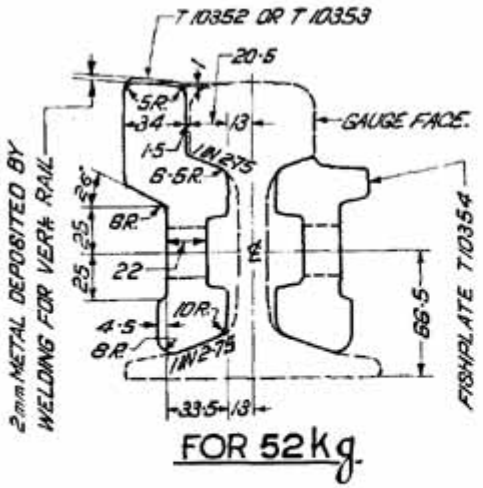
RAIL SECTION & DRG: Nº		SPECIAL FISHPLATE (OUT SIDE) FOR RAILS VERTICAL	SPECIAL FISHPLATE (OUT SIDE) FOR RAILS CANTED	ORDINARY FISHPLATE (IN SIDE)	FISH-BOLT	DIMENSIONS (mm) A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S
52kg.	T 10350 OR T 10351	T 10353	T 10352	T 10354	T 11692	1020	166	191·5	179	56	192·5	85	91	75	101	68	332	8	27	58 × 32	66·5	145	25
90 R.	T 10397 OR T 10398	T 10399	T 10400	T 10401	T 11692	750	114	140	127	51	141	60·5	64	50	74·5	68·2	228	7	27	58 × 32	60	145	25
75 R.	T 10451 OR T 10452	T 10454	T 10453	T 10455	T 11692	690	102	127·5	115	52	128·5	54·5	57·5	44·5	67·5	61·1	204	6·5	27	58 × 32	54	145	25
60 R.	T 10360 OR T 10361	T 10363	T 10362	T 10364	T 11693	690	102	128	116	50	129	56	56·5	45·5	67	54·8	204	5·5	24	55 × 28	47·5	120	22

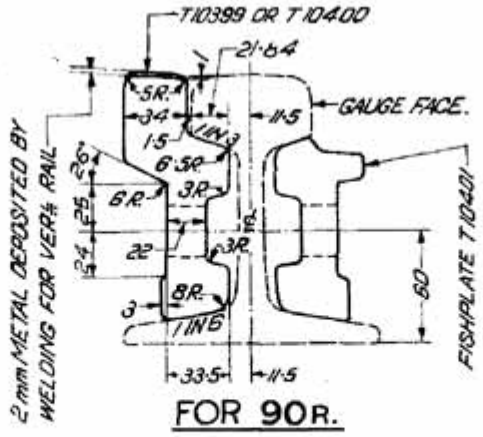
MAXIMUM EXPANSION 66 mm			
SPAN IN METRES	45·7	61·0	76·2
RANGE OF TEMPERATURE	123°C	92°C	74°C

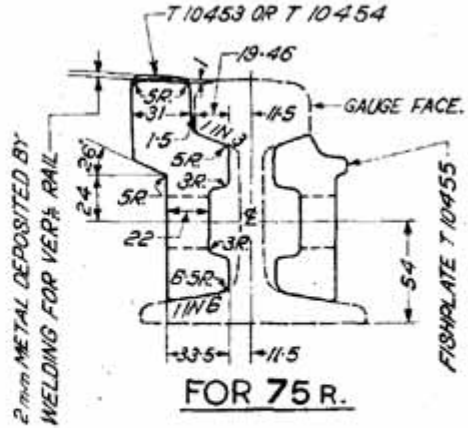
SPECIAL FISHPLATES FOR EXPANSION JOINTS











RF 6
SHEET 7 OF 8

FOR GIRDER BRIDGES ABOVE 30.5 METRES & UP TO 76.2 METRES CLEAR SPANS

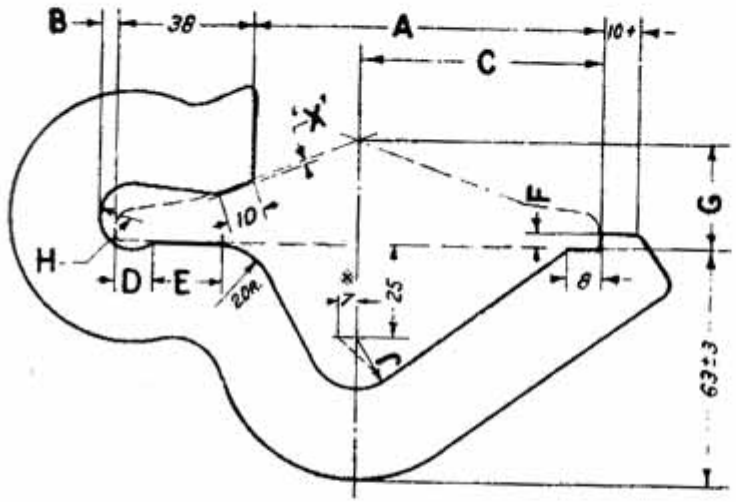
PART NUMBERS AND MAIN DIMENSIONS

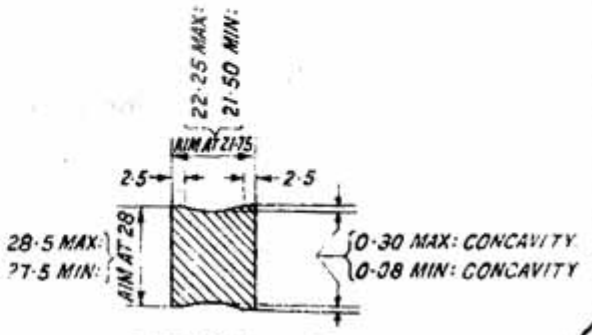
RAIL SECTION & DRG: Nos		SPECIAL FISHPLATE (OUT SIDE)		ORDINARY FISHPLATE (IN SIDE)	FISHBOLT	DIMENSIONS (mm)					
		FOR RAILS VERTICAL	FOR RAILS CANTED			A	B	C	D	E	O
52 kg	T 10350 OR T 10351	T 10353	T 10352	T 10354	T 11692	1020	166	191·5	179	56	27
90 R.	T 10397 OR T 10398	T 10399	T 10400	T 10401	T 11692	750	114	140	127	51	27
75 R.	T 10451 OR T 10452	T 10454	T 10453	T 10455	T 11692	690	102	127·5	115	52	27
60 R.	T 10360 OR T 10361	T 10363	T 10362	T 10364	T 11693	690	102	128	116	50	24

RF6
SHEET 8 OF 8

NOTE:- SECTION OF SPECIAL FISHPLATES FOR CANTED RAILS IS THE SAME AS THAT FOR VERTICAL RAILS. IN CASE OF VERTICAL RAILS, 2 mm METAL IS DEPOSITED BY WELDING AT THE TOP & IS RAMPED DOWN AT THE ENDS FOR 100 mm LENGTH. IN CASE OF CANTED RAILS, THE FISHPLATE ITSELF IS PLANED AT THE ENDS BY 1 mm FOR 100 mm LENGTH AS SHOWN IN THE ELEVATION ABOVE.

RAIL ANCHORS





SECTION OF ROLLED BAR

RF 6A
SHEET 1 OF 2

NOTE :-

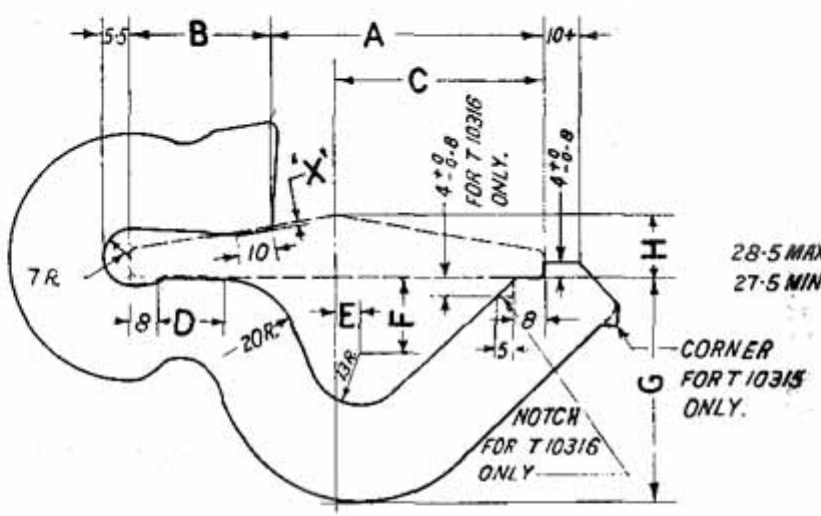
DIMENSION 'X' MUST BE SUCH AS TO ENSURE THAT THE FINISHED ANCHORS COMPLY WITH THE PHYSICAL TESTS LAID DOWN IN THE RELEVANT SPECIFICATION.

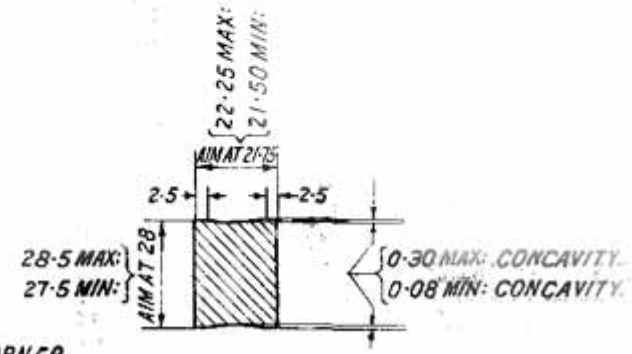
* DIMENSION FOR UIC 60 kg ONLY

TABLE OF DIMENSIONS

RAIL SECTION	DRAWING NUMBER	DIMENSIONS (mm)								
		A	B	C	D	E	F	G	H	J
UIC60kg	RDSO T-1045	102	6	75	10	20	$5^{+0}_{-0.8}$	31·5	10	14
52 kg	T 10327	98·00	4·0	68	10	20	$5^{+0}_{-0.8}$	29	9	14
90 R.	T 10313	98·53	6·5	68·26	8	22	$4^{+0}_{-0.8}$	20·64	8	14
75 R.	T 10314	84·24	5·5	61·12	8	16	$4^{+0}_{-0.8}$	18·65	7	13

RAIL ANCHORS





SECTION OF ROLLED BAR

RF 6A
SHEET 2 OF 2

NOTE:–

DIMENSION 'X' MUST BE SUCH AS TO ENSURE THAT THE FINISHED ANCHORS COMPLY WITH THE PHYSICAL TESTS LAID DOWN IN THE RELEVANT SPECIFICATION.

TABLE OF DIMENSIONS

RAIL SECTION	DRAWING NUMBER	DIMENSIONS (mm)							
		A	B	C	D	E	F	G	H
60R.	T 10315	71·54	38	54·77	17	6	20	57±3	16·67
50MS&50R.	T 10316	65·01	35	50·00	13	3	16	53±3	15·08

TABLE SHOWING WEIGHTS & QUANTITIES OF

RAILS & FASTENINGS

		LENGTH OF RAIL IN USE	9 METRES	10 METRES	11 METRES	12 METRES	13 METRES
RAILS	NUMBER PER TRACK KILOMETRE		222·22	200·00	181·82	166·67	153·85
	50R.	WEIGHT OF EACH (TONNES)	0·223	0·248	0·273	0·298	0·322
		WEIGHT PER TRACK KILOMETRE	49·60 TONNES				
		NUMBER PER TONNE	4·480	4·032	3·665	3·359	3·101
	60R.	WEIGHT OF EACH (TONNES)	0·268	0·298	0·327	0·357	0·387
		WEIGHT PER TRACK KILOMETRE	59·52 TONNES				
		NUMBER PER TONNE	3·734	3·359	3·055	2·800	2·584
	75R.	WEIGHT OF EACH (TONNES)	0·334	0·371	0·408	0·446	0·488
		WEIGHT PER TRACK KILOMETRE	74·26 TONNES				
		NUMBER PER TONNE	2·993	2·694	2·448	2·244	2·072
	90R.	WEIGHT OF EACH (TONNES)	0·401	0·446	0·491	0·535	0·580
		WEIGHT PER TRACK KILOMETRE	89·22 TONNES				
		NUMBER PER TONNE	2·491	2·242	2·038	1·868	1·724
	52kg.	WEIGHT OF EACH (TONNES)	0·467	0·519	0·571	0·623	0·674
		WEIGHT PER TRACK KILOMETRE	103·78 TONNES				
		NUMBER PER TONNE	2·141	1·927	1·752	1·606	1·482
	UIC 60Kg	WEIGHT OF EACH (TONNES)	0·543	0·603	0·664	0·724	0·784
		WEIGHT PER TRACK KILOMETRE	120·68 TONNES				
		NUMBER PER TONNE	1·841	1·657	1·507	1·381	1·275

RF 7
SHEET 1 OF 4